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Original Articles

THE TWENTY-EIGHTH MAUDSLEY LECTURE: MEDICINE AND THE LAW

By

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I WAS asked in the early months of 1952 to deliver this lecture towards the end of 1953. Of course I realized that it was a great honour to be asked, for I knew something of the work of the late Dr. Maudsley, and I was aware of the immense contribution he had made in the treatment of the insane.

I accepted the invitation, and I confess that I am always more ready to accept such invitations if they involve some engagement in the far distant future. Under such circumstances I accept in haste and repent at leisure. I have repented, because I am painfully conscious of the fact that I have no qualifications which justify me in expressing my views to such an audience comprising many people whose views are of much greater value than my own.

I think it right to set out my experience—or perhaps I should rather say—to indicate my lack of experience. I claim no sort of scientific knowledge. I never had a considerable criminal practice at the Bar. Romilly, whose name is honoured amongst lawyers for his work in the reform of the criminal law of his day, was a Chancery lawyer—he had no practice in the criminal Courts.

I speak as a legal 'man in the street'; and I can only cover my nakedness in such an assembly by pleading that the administration of the criminal law and the administration of prisons has been for many years an abiding interest.

My paternal ancestors were Yorkshire Quakers; and perhaps it was in my blood to take an interest in prisoners and prisons; and when I was called to the Bar in 1909 I started my practice on the criminal side. However, at a very early stage I was entrusted with work by the London General Omnibus Company and I rapidly acquired a large practice in 'running down' cases—so large, in fact, that I had but little time for criminal work.

In those early days there were a large number of cases involving injury to horses. I became familiar with the vet. who gave evidence for the plaintiff, explaining that the injury the horse had sustained had rendered him almost useless; whereas the vet. for the defendant would assert that the horse was all the better for the rest involved by the accident.

With regard to injuries to persons, the same pattern would repeat itself. The plaintiff's doctor depicted the injuries caused by the accident as terribly severe; the defendant's doctor would say that they were trivial.

In those days the practice had not developed of having a medical report prepared by some neutral doctor representing neither the plaintiff nor the defendant; nor was there any arrangement for a consultation between the two doctors in the endeavour to present an agreed report. These innovations are common enough today and represent a great advance; and as this topic bears upon what I have to say presently, I want to try to analyse what went wrong; for there is surely room for an extension of that principle.

It was not, I am convinced, that either vet. or doctor was consciously trying to deceive the Court by telling untruths. It was rather due to the perfectly natural human tendency to "take sides". The doctor or the vet. would want to do the best he could for his client whilst sticking to the truth; and approaching his problem from that angle, he would honestly come to the conclusions he indicated.

The tendency to take sides is ineradicable. We find it in the ordinary affairs of life. The passenger in the car involved in an accident inevitably tends to take the side of his driver, just as the doctor tends to take the side of his patient.

This tendency can, I believe, only be avoided if the witness is completely independent, and does not become more involved with the one side than with the other.

It so happened, however, that after a few very active years in 'running down' I drifted in to the Commercial Court. I acquired a large practice in that Court—and consequently crime, criminals and insanity passed me by.

In 1922 I became a member of Parliament, and in that year I started visiting prisons; and I have continued to do so ever since that time. I have visited nearly all the prisons in this country, and also prisons in most European countries.

I shall never forget my first visit to a prison. It was to Maidstone. I was accompanied by another M.P., who has since rendered great services to the State. We were both young and anxious to learn.

At about the same time, namely in 1922, I was appointed a member of the Royal Commission on Lunacy. I had a vague idea that in the course of our enquiries we should come across a considerable number of persons who were detained in lunatic asylums for no good reason. I imagined perhaps, as one reads in story books, that scheming relatives would have arranged that people possessing some wealth should be deprived of the opportunity of squandering it, so that it might in due course of time be handed over to the relatives. I fully expected that we should come across instances of harsh, or perhaps even brutal, treatment.

I gave a great deal of time to the work of that Commission. I visited both public institutions and private institutions where certified patients were detained. I came across no single case supporting the fears which I have indicated. I thought that without exception the medical superintendents carried out their duties in a humane and considerate way, and I came across no evidence of harsh treatment. Undoubtedly, those in charge were sometimes not unnaturally hesitant about allowing a discharge for fear lest the patient should do himself some injury, in which case had there, for example, been an inquest, some coroner might have expressed disapproval of the conduct of the superintendent in allowing such a patient his liberty.

Of course, I realize that the fact that no cases of improper detention were brought to our attention does not prove that no such cases exist. It is an obvious danger, and the circumstances should surely be kept under constant review.

I think, if only for this reason, that the Government were wholly right in appointing a new Royal Commission to examine the whole subject again; but there is another and more important reason.

Public opinion has changed considerably, and scientific opinion perhaps more, within the last thirty years. After all, in the days of our grandfathers lunatics were still popularly regarded as persons possessed by the Devil. It has taken a long time for the ordinary folk to realize that a man may have a mental illness just as he may have a bodily illness; that there is nothing to be ashamed of in falling a victim to either form of disease; and that it is useful in both cases to consult a doctor skilled in such matters at an early stage. The attitude of the public towards voluntary treatment has completely altered, and the old prejudices have largely gone.

Dr. Maudsley himself was a pioneer along these lines. He realized how important it was that the patient should be encouraged to accept responsibility for his own cure; and that the very fact that a patient was not prevented from walking out of an institution if he was minded to do so was in itself a reason why he did not want to walk out. He proved that this sense of personal responsibility was an important factor towards the recovery from the illness.

I feel sure that the emphasis of the future will be more upon early voluntary treatment and less upon certification. The Commission will do much good if it emphasizes this aspect of the matter.

I should add on this topic that I became Lord Chancellor in 1945 and remained as such for some 6½ years. As you are well aware, every patient has the right to correspond with the Lord Chancellor. I used to receive a very large number of letters from the inmates of such institutions (unhappily some of my correspondents have not realized that I have ceased to be Lord Chancellor); and periodically I used to make it my duty to go down unannounced to the institution in question and investigate the complaint. I never came across any instance which caused me concern. I remember finding, for example, in one case that a very tall patient had too short a bed, but apart from things of this sort, I never found anything about which I was disturbed.

In the year 1929 I became Attorney General and thus renewed after a long interval my acquaintance with the criminal law. I became distressed to find how large was the number of cases of blackmail and to find that so many persons who had committed offences were having their lives made miserable by others who were threatening to expose them. In those days it was quite exceptional for the person blackmailed, in the event of a prosecution for blackmail, to be referred to in the press merely as Mr. X. I did my utmost to encourage this, knowing that if I succeeded I should strike a real blow at the hold which the blackmailer possessed over his unhappy victim. I like to think that, thanks to the willing co-operation of the press, this practice has now become so common as to be almost invariable, and I hope and believe that the number of blackmail cases has gone down enormously.

I became impressed with another fact. A very large percentage of the blackmail cases—nearly 90 per cent. of them—were cases in which the person blackmailed had been guilty of homosexual practices with an adult person. Indeed, it was obvious that there was a class of adult persons who were carrying on business as homosexuals and making a living out of blackmail.

Conscious as I became of the extent of blackmail, I asked myself whether our law was wise in making it a criminal offence for two male adults to commit acts of indecency with each other in private.

It is, of course, a very different matter if one of the participants is a young person—and I should be prepared to give a wide definition to the term "young person".

It has always been an offence at Common Law to be guilty of such conduct in public, and this, of course, is plainly right.

The history of our legislation is of some interest. In 1885 a Bill to amend the Criminal Law passed the House of Lords. It was a Bill—I quote its title— "to make further provision for the protection of women and girls, the suppression of brothels and other purposes". The Bill as it left the House of Lords contained no reference whatever to indecency between males. In the course of its passage through the House of Commons, Mr. Labouchere moved a new clause which made the commission of acts of indecency between male persons a criminal offence, whether in public or private. The Speaker was asked by one Member whether it was in order to move a clause dealing with a wholly new topic into such a Bill. He ruled that it was a matter for the House to decide, and the clause was then agreed to without any discussion. There was no discussion of this new clause when it was sent back to the House of Lords.

After the Bill had become an Act it received considerable criticism in legal circles. One experienced recorder called it "the blackmailer's charter".

I am afraid it is a fact that the passage of that Act has assisted blackmailers in their loathsome trade. The corresponding acts between women have never been brought within the ambit of the criminal law. It is, I am convinced, foolish to think that the ambit of the criminal law can be, or should be, co-extensive with the ambit of the moral law.

I confess that the doubts which I then entertained have never been wholly removed, though I do not know enough of the matter to form a confident opinion of my own. It may well be that the present time, with its marked increase in sexual offences, is not opportune for an alteration in the law in the sense I have indicated.

I had other experiences as Attorney General which satisfied me that there were some gaps in our criminal system which might usefully be filled if we had the necessary money to spend.

Take, for example, cases of people addicted to drugs. I remember when I was Attorney General my attention being brought to one particular case of a person who had committed a criminal offence with the object of obtaining drugs for his own use. A prosecution, for which of course I as Attorney General was responsible, was pending against him. I was told of it—for I knew nothing about it—by some person in a prominent position in life who knew all the tragic circumstances, and knew how it was that this person came to get a craving for drugs. It so happened that I knew very well the most distinguished solicitor who was acting for that person, and I talked to him as friend to friend about the course I ought to take. He said of course that, as this person's solicitor, he was defending the case and would fight it to the end, but he added off the record that if the person in question was his own child, he would hope that that person would receive a sentence of such length that he could be cured of his craving.

I shall speak presently of the need for some institution, as little like a prison as possible, to deal with such cases.

After ceasing to be Attorney General, again I had but little experience of the criminal law, though I continued my visits to prisons. But when in 1945 I was appointed Lord Chancellor, I naturally became much more closely concerned with the administration of the criminal law, and it fell to me to pilot through the House of Lords the Legal Aid System and the Criminal Justice Act; and in so doing I had to take a more prominent part that I liked in the controversy which raged about the desirability of continuing the capital sentence, or of dividing murder into different degrees.

If I were asked about my general impressions of the prisons I have visited, I should say that the weakness of the system inevitably consists in treating prisoners as one class, whereas of course, each prisoner in an ideal system requires his own individual treatment.

It all comes to this, that a system or an institution which is suitable for one prisoner may be quite unsuitable for another. That a regime which is too strict for one may be too soft for another. No doubt in an ideal system there would be many differing kinds of institutions, and highly skilled persons would select which prisoners were appropriate for what institutions.

Broadly speaking, if I may use the inaccurate and unscientific formula, there will be better differentiation between the bad and the mad, and to that in fullness of time we shall come. For the rest, I would point out that the Prison Commissioners have vast experience and, with the very limited financial resources available to them, are doing all they can to differentiate between different classes of prisoners.

I have detailed some of the rough conclusions I have drawn from my somewhat limited experience, and I am conscious of the fact that these experiences have little to do with the subject of my address. Let me apply some of these experiences to a subject which is more germane to the topic of Medicine and the Law.

I assume for this purpose, without expressing any opinion of my own, that the death penalty is to continue. If it were decided to abolish the death penalty, many of the problems which arise would, of course, disappear. On that topic I desire to express no opinion beyond saying this: that in my belief the sole justification for the continuance of the death penalty is its deterrent effect. If one could predicate that more murders would be committed if the death penalty were abolished, then the case for retaining that penalty is, to my mind, made out. If, on the other hand, the abolition of the death penalty would have no such effect, then I believe it should be abolished. In arguing this question everybody is entitled to make what use he can of the plentiful supply of statistics which are available to us.

So long as the death penalty continues, there will be cases in which the person accused bases his defence solely on insanity. It is this that gives rise to the main trouble which exists between the lawyers and the doctors.

That the psychiatrists think—whether rightly or wrongly—that they are treated by the lawyers without much respect is, I believe, the fact. Some of them undoubtedly think that counsel by their questions make them "a popular butt and laughing stock". They feel, too, that counsel, and sometimes even Her Majesty's judges, have not got a scientific approach to these problems. I confess, too, that Her Majesty's judges have sometimes admitted to me that they do not derive as much help as they would have expected from the evidence of the psychiatrists.

I do not myself think that either the lawyers or the psychiatrists are to blame for this undoubted state of affairs. The fault perhaps lies rather in the system than in the individuals. Yet it is by no means easy to see how the system can be altered.

Fundamentally, I think the trouble is this: that the eminent medical witnesses are called, as the case may be, for the prosecution or for the defence. They are identified with one side or with the other side. They are in exactly the same position as the veterinary surgeons or the doctors in my early days of running down cases. The idea of a joint report, or of a psychiatrist who is completely independent and unidentified with either side, has not yet developed.

To those who would assert that the lawyers, or even the judges, lack a scientific approach, I would reply as follows: Let it be remembered that in all these cases science in the person of the medical witnesses is speaking with an uncertain voice. The trumpet sounds with an uncertain note and no one prepares himself for battle. There is generally one eminent expert who says that the accused did have that degree of responsibility which the law requires, and there is another equally eminent expert witness who says that he did not. It is a fallacy to blame either the lawyers or the judges for not attaching sufficient importance to the evidence of these witnesses, when in fact that evidence is about equal on both sides.

I therefore greatly welcome the proposal contained in the Royal Commission's Report that every prisoner charged with murder should be examined by two doctors, one an experienced psychiatrist who is not a member of the Prison Medical Service, and the other an experienced member of that Service; and I stress the word "experienced", since it is inevitable that in some of our smaller prisons the prison medical officer has not had a training in psychiatry.

Neither the prosecution nor the defence would be limited in their selection of witnesses to those who made the report, but I contemplate that the report would be made available to both sides so that they would have the benefit of it in preparing their case. In practice, I should imagine that the persons making the report would generally be called in evidence by one side or the other, and the fact that the report was obtained not at the instance of any party to the suit would add to its weight and authority, and would probably lead to a more scientific approach to the problem involved.

For my own part, I care much more about this than I do about any reframing of the M'Naghten Rules. It cannot be too often remembered that the M'Naghten Rules are not a test of sanity and were not formulated as such. They are a test of responsibility in law for the acts done. I agree that they are illogical; I agree that the test they provide is frequently stretched, and that therefore it may fairly be said to be no test at all. For who can measure responsibility by an elastic yardstick?

Yet, in practice, the Rules have worked well, and the attack on them seems to me to be based on their lack of logic, and not on the fact that they have worked badly. It has often seemed to me that we differ from the Latin races in that we judge any rule or institution not, as they do, from the point of view as to whether it is logical, but rather from the point of view—Does it work well? The British indeed seldom make themselves more ridiculous than when they seek to be logical. Logic is not a characteristic of our native genius. If anybody can convince me that the rule is working badly and that they have a better rule, then I should be quite prepared to accept that better rule. At present I remain unconvinced.

There are two proposals for the reform of the M'Naghten Rules canvassed in the report of the Royal Commission.

The Commission, or at least a majority of the Commission, are of opinion —as was the Atkin Committee—that the rules would be improved if the jury were asked to consider the question of irresistible impulse. If this proposal, which appears to find favour with the Commission, were to be adopted, the question to be put to the jury would be as follows: "Was the accused at the time of committing the act in such a condition, as a result of disease of the mind or mental deficiency, that he did not know the nature and quality of the act, or did not know it was wrong, or was incapable of preventing himself from committing it?"

Now I would point out that the addition of the last head has no practical effect in extending the area of irresponsibility unless it is assumed that there is a class of persons suffering from some disease of the mind which enables them to realize the nature and quality of the act they are committing, and to realize that it is wrong, and yet, owing to that mental disease, find themselves impelled by an irresistible impulse to commit the act in question. For it is manifest that if an accused person is prevented by a disease of the mind from realizing the nature and quality of his act, or from knowing that it is wrong, he escapes responsibility under the existing law.

Are there people who know the nature and quality of the act they are committing, and know it to be wrong, and yet cannot help doing it? I am trespassing on the territory of the psychiatrist, and it is not for me to answer this question.

Assuming that there are or may be such persons, I would propound a further question: Can the psychiatrist distinguish between those who cannot and those who do not resist an impulse?

I have recently been reading works by eminent psychiatrists and I gather that they admit frankly that in our present state of knowledge it is impossible to distinguish the one from the other. Unless I am told—and I am very willing to learn—that such a distinction can be drawn, I fail to see that there is any point in asking a jury to decide a question which baffles the psychiatrist: but at present it seems to me that I am told the exact contrary.

Take, for example, Dr. Neustatter's book *Psychological Disorder and Crime* published this year; on page 96 I find this sentence: "As long as there is no proof which impulse is genuinely irresistible it would clearly be unsafe to allow it as a plea, as those who would have controlled themselves for fear of the consequences might be tempted not to do so, with consequent danger to the public."

Dr. Henry Yellowlees in his evidence before the Royal Commission made it clear that he was not in favour of extending the M'Naghten Rules by including irresistible impulse. "The only irresistible impulses I recognize," he said at Question 7350, "are those that occur in the advanced forms of certain well-known types of insanity: in established catatonic stupor, for example, where you do get a sudden irresistible impulse. An irresistible impulse does not occur except in the case of a person who has not known the nature and quality of his acts for several years."

I recognize, of course, that the proposal to insert a question to the jury about "irresistible impulse" is supported by the highest authority. It was recommended unanimously by the Atkin Committee in 1923, and that Committee comprised persons of the greatest experience; and it is recommended again by the Gowers Commission.

Lord Darling in 1924 introduced a Bill into the House of Lords to carry out the recommendations of the Atkin Committee—but he received no support and the strongest criticism from Lords Sumner, Dunedin and Hewart, and wisely did not press his proposal for a second reading.

The other proposal which finds favour—and is, I gather the first favourite—is that we should give up any attempt to formulate any test whatever of the dividing line between those who are and those who are not responsible in law for their actions.

How would the judge instruct a jury as to the relevant law as to responsibility of this proposal were to be adopted? I suppose on some such lines as the following: "Members of the Jury, you have heard the evidence. You will have noticed that the doctor called for the Prosecution thinks the prisoner was completely sane, and the doctor called for the Defence thinks he was hopelessly insane. You must ask yourselves whether the prisoner had a disease of the mind; and you must ask yourselves further whether you think that that disease was of such an extent and intensity that you ought to bring in a verdict that though he did the act he was insane. I cannot help you any further."

Perhaps the Usher in escorting the jury to their retiring room would ask the foreman whether he had a coin on him in case it was decided to settle on the well-established principle of tossing it up.

It must be remembered that our system places the responsibility of deciding all relevant questions of fact upon the jury. It would be a mistake to make the test so scientific that the twelve good men and true who sit in the jury box were quite unable to understand it. It is, under our system, for the jury to find the facts, and not for the jury to concern itself with the appropriate punishment; and I devoutly hope that neither judge nor jury will ever be placed in the position when they have to decide as a matter of discretion whether or not the death penalty shall be enforced.

Many people have been shocked to notice that the sentence of death is pronounced in many cases by the judge; and a reprieve is allowed.

This does not shock me; and indeed it seems to me to show that the present system—if it is decided to retain the death penalty—is working efficiently, and to demonstrate the care that is taken by the Home Secretary and his advisers.

I should most certainly welcome an alteration in the law so as to remove constructive murder and suicide pacts from the category of murder: as was done in recent years by the Infanticide Acts.

In this way the number of death sentences may be reduced; but it is, to my mind, unfair to a jury and against all our traditions to entrust to them the duty of determining not only the facts but also the degree of punishment. What would happen, I wonder, if the jury agreed to a verdict of guilty but differed as to the appropriate punishment? Endless possibilities are opened up.

I believe, in short that our present system, notwithstanding its obvious logical deficiencies, works well; and I cannot regard the discretion of the Home Secretary in deciding whether or not to advise mercy as conflicting with the province of the jury. The jury's task is to say whether the prisoner was responsible in law for his action; the Home Secretary's task is to consider whether, even although he was so responsible, the death penalty should be enforced. The Home Secretary is at liberty to take into account any fact even although it was not before the jury. Moreover, whereas the jury are concerned with the mental state of the accused when he committed the act, the Home Secretary is concerned with his state of mind at a later—and possibly a much later—date. No one wants to hang an insane man: though I confess the idea that an insane man cannot make his peace with his Maker seems to me to be doubtful theology.

I believe that so long as we continue to have the death penalty—and as to the desirability of so doing I express no opinion—the present system should go on. I agree, of course, that the form of the verdict "Guilty but Insane" is illogical; and this, I think, can easily be remedied in the form suggested in the Commission's Report.

For myself, I believe that, notwithstanding the lack of sympathy which exists today between the lawyers and the psychiatrists, the psychiatrists will slowly but surely come into their own.

It is, of course, not merely and not mainly in this particular topic that psychiatrists will come into their own. What will the prisons of the future be like and how will they be conducted? I believe the lines on which the Prison Commissioners are working today will be extended and intensified, as indeed they would themselves do if they had the facilities. Prisoners will be much more closely classified. Those who are bad will be separated from those who are mad;

and with regard to the latter, the psychiatrists will be given a greater opportunity to effect cures. The emphasis will be upon cure and not upon punishment. With regard to the former, stern but not inhuman discipline, and plenty of worth-while work, will be relied upon. The element of punishment will not be, and should not be, disguised.

There will, I should imagine, be homes as little like prison as possible, without the stigma which attaches to prison, but with the power to prevent the inmates from walking out, which will be available for such people as drug-fiends or alcoholics, who have committed criminal acts.

The Commissioners in paragraph 54 of their Report advocate the establishment of such institutions also for psychopaths and other prisoners who are mentally abnormal; and they recommend, too, further research into problems of psychopathic personality. On these matters I feel they are on strong ground and should receive the support alike of the lawyers and the doctors.

There is so much to learn. It is no criticism of those who work in this field to say that our knowledge is slight and patchy. Those who know most are, I find, always the most ready to admit how little they know.

The Commissioners are right in praising the work of the special forensic psychiatric clinics on the Continent of Europe. I am sure that in the future we shall differentiate more and more between those who need to be cured and those who need to be punished; and I expect that in process of time we shall tend to increase the former class and lessen the latter.

With regard to sexual cases, I believe that these will come more and more to be looked at as a problem for the doctor rather than for the penologist. I am not going to air my ignorance on this topic, but it is not at least possible that treatment by hormones or glandular secretion may be found, which will help these unhappy people to eradicate their abnormal desires?

We have the personnel to enable us to conduct all these experiments. In the Prison Commissioners we have a fine body of enlightened men whom we can safely trust. Our doctors and our psychiatrists are of deservedly high standing in the scientific world, but these experiments cost money and involve labour, Society should not grudge the necessary money for this purpose.

Alas, when all is said and done, when all these people have done their best, there will be a hard core of evil-doers, who will not be restrained by the deterrent effect of prison, nor helped by the psychiatrist. If people show that they are determined to lead a life of crime, then society has, to my mind, a right to protect itself by depriving them of their liberty. Transportation, which had much to be said for it, is no longer practicable. For such people preventive detention for long periods of time seems to me inevitable, not primarily from the point of view of deterrence, not from the point of view of reformation—both of these are on my hypothesis impossible; but from the simple point of view of the protection of society. I believe that we shall take steps to see that the incarceration of such persons is made as bearable as possible, and the idea of punishment, beyond that which is mooted in the deprivation of liberty, should be rigorously eschewed.

I hope I shall be forgiven for having made to you these random observations, which do not claim to be based upon scientific knowledge. I have spoken as the man in the street, but as the man in the street who has been interested in this problem for many years past and has given great thought to it. After all, when the scientists, the penologists and the psychiatrists have had their say, it is the man in the street who ultimately has the responsibility of deciding what shall be done. That must be my excuse for letting you know what I believe the man in the street is thinking about these problems.

PSYCHOTHERAPY AND THE PHYSICAL METHODS OF TREATMENT IN PSYCHIATRY*

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It is only proper that I should begin this paper with a disclaimer. I am not a psychotherapist, nor am I one who has devoted much of his time to the physical methods of treatment. My only qualification to carry this burden at all is that I believe I am somewhat in a neutral position and have not been fired alone by either set of enthusiasms—neither those which activate the physical treatment experts, nor those which sustain the psychopathologists. Necessarily therefore what I have to say will be from a personal viewpoint, although of course not a detached one and I will apologize once for this and not again. The subject of this talk is obviously an important one and must be the concern of psychiatrists of all persuasions. Those who are psychotherapists cannot ignore the fact that the main mental disorders which constitute the serious core of psychiatric disability in the community are treated first and foremost by physical methods, insulin coma, E.C.T. and surgery, while those who are non-analytical psychiatrists cannot ignore the fact that the less serious but enormously more prevalent conditions are treated in the main by psychological methods. The question might be asked, are there then two types of psychiatric disorder, the one only treatable by a physical method, the other by a psychological method? But this is a superficial view; with the greater sophistication of physical methods more and more patients who formerly were treated by psychotherapy are now subjected to some physical treatment, and conversely—and this is particularly evident from the American literature—more and more patients, particularly schizophrenics, formerly treated by insulin or surgery are now being subjected to psychoanalysis. Each side is therefore invading the territory of the other, but there is no common language or ground for discussion between them. Now of course there are many different forms of physical treatment, just as there are many different types of psychotherapy. Let me take the physical treatments first. We can I think divide them roughly into two classes. There are those which by their universal use for a special type of mental state or special group of symptoms have come to be regarded, rightly or wrongly, as almost a *radical* treatment for such conditions. For this group no psychopathological preconception regarding the patient, his problems, his methods of adaptation and defence are necessary. All that is needed is a clear statement of his symptomatology, its duration and course to enable the physician to determine the type of treatment. In this group therefore we can place insulin comas, E.C.T., and cerebral surgery of the leucotomy type. It is only necessary to demonstrate schizophrenic thought disorder and primary delusions of recent onset to arrive at the view that insulin treatment is advisable; on the other hand depressive affect, depressive sleep disorder and loss of weight, continuing beyond the reasonable period following a stress situation or the absence of a stress situation particularly in the involutional period of life will lead many to recommend E.C.T. without more ado. For chronic obsessional tension, rumination or distressing psychotic ideas interfering with adaptation, leucotomy or some modified form of surgery come to mind.

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The second group of treatments under the general heading, physical methods, are of quite a different nature. In this class we can place the use of pentothal, sodium amytal, ether, CO_2, acetylcholine and methedrine, given to activate, sustain or make possible a cathartic or abreactive therapy. This group is obviously quite different from the first, since the physical agent used is given in the service of a strictly psychotherapeutic situation. These drugs are only used within a framework of psychopathological hypothesis regarding the patient's problem. I point this out since there has been a tendency in the literature to suggest that E.C.T. and insulin owe their method of action to a similar process—that is a cathartic process. Even if this were true, it is necessary to point out that the ways in which the two types of treatment are given, and the attitudes of psychiatrists to the two types are essentially different. The one is based upon a psychopathological hypothesis and can only be given when a great deal is known about the patient, while in the other case, it is very frequently administered without any such knowledge, and there is no hypothesis.

Psychotherapeutic methods can of course also be classified. Leaving aside suggestion and persuasion which are now used chiefly by our colleagues in other branches of medicine and educative psychotherapy which has a place everywhere, we can divide psychotherapies into those which are strictly cathartic or abreactive and those which are analytic in their aims. It is to be recalled that Breuer and Freud first used the cathartic method, which grew out of their experience of hypnosis. Catharsis became in fact for a time in those early days, the object of their psychotherapeutic technique, and it was only when Freud distrusted the results of hypnosis that he devised the method of free association, and then later recognized the significance of transference as essential to the procedure. It is important perhaps to emphasize this: that the transference—counter-transference phenomena are in fact important in both the cathartic and analytic methods, but more particularly in the latter. Now it is obvious that the second group of physical methods of treatment which have been found to be so useful owe their action entirely to their capacity to facilitate the cathartic process. In fact it has been stated, by Sargant and Shorvon in particular, that the content of what is abreacted is not perhaps so significant as the degree and quality of the emotions aroused and their discharge in motor and visceral behaviour. Despite this there are many who claim that catharsis can always be achieved more readily and its results are best when the therapist has an understanding of the patient's psychopathology. Rapport with the patient, that is the development of a transference situation is an absolute and necessary prerequisite for the cathartic process. During the development of this situation the psychiatrist becomes aware of the patient's need to discharge his affects and tensions and also of the patient's capacity to do so—that is his capacity to externalize his dammed up emotion. This, perhaps, as much as any symptom-constellation determines the psychiatrist's choice of a cathartic method of treatment. It is here that the difference lies between the type of patient for whom insulin, E.C.T. or surgery is prescribed. The first type of patient has demonstrated to the psychiatrist, or the psychiatrist has divined by empathy, that catharsis is possible and will be helpful, while the second type of patient by reason of his failure to develop a transference appears to the psychiatrist to be shut off from such an approach. The danger lies in making the division not upon the failure to establish transference, but as I have said upon the presence of a syndrome or grouping of symptoms, because if this is accepted the primary aim of all treatment, which must be psychotherapeutic, may be neglected and the patient not given the opportunity or time to establish a transference relationship. Unfortunately if the decision to give E.C.T., insulin, etc., is made upon symptoms only, the influence which such treatments have upon the psychotherapeutic process is likely to be ignored altogether. When this happens the psychiatrist does a sudden shift in his thinking and is preoccupied solely with the physiological effects of his technique. It is therefore of some interest to consider how non-analytical psychiatrists and psychoanalysts think about these treatments and how they work.

Nearly all psychoanalysts take a strictly psychological view, despite the fact that psychoanalysis is a theory founded on biology. On the other hand nearly all psychiatrists take a physiological view despite the fact that for all the other treatments they take a psychological view, and for one and the same patient will attempt to treat him by a cathartic psychological method and chemical activator for a period of time and then give up and give him E.C.T. When this happens the psychiatrist is inclined to say that the patient was not suffering from a "reactive" depression after all but an "endogenous" one.

A visitor from another planet would I think be very perplexed by a perusal of the leading journals of the world which are concerned with psychiatry. If he looked up the question of the treatment of schizophrenia, for example, he would find some journals devoted entirely to articles giving reports of results of shock treatment, insulin, psychosurgery and hormone therapy and quite different ones devoted to the analysis by psychological methods of the personality problems of such patients: he would have to search a long time to find an article which dealt with both the life situations, the personal psychopathology, the psychoanalysis and the treatment by insulin, of such patients. This sort of thing happens very seldom. Yet we know—or at least the literature tells us—that schizophrenics and manic depressives can be treated successfully by both these methods.

It is of course true that lip service is paid to psychotherapy by most of those who practise these treatments. But the type of psychotherapy utilized is mostly educative, social, occupational and is aimed at reintroducing a patient back into a life from which he has been isolated by his psychiatric illness. Such treatment bears no resemblance to the psychotherapeutic task which is the essential programme for all those patients who are treated by the abreactive, cathartic or analytic methods. It seems that once a decision to perform a leucotomy, to give E.C.T. or to give insulin is made, the patient and his illness are immediately viewed in an entirely different light. Sometimes one feels that this change of attitude for the psychiatrist comes as a personal relief.

Now this is a matter which I propose to look at a little more closely. To all those who are *sure*, reiterate sure, that what is wrong with a schizophrenic patient is an unknown hormonal defect, perhaps an imbalance of sugar versus mineral corticoids secreted by the adrenal cortex, or an as yet undiscovered hypothalamic lesion, or a defect in the O_2 metabolism of the cortical cells, and that this and this alone is what is wrong, for all such the matter is fairly simple. Psychotherapy is necessary at the educative level just as social and physical rehabilitation is necessary for a fracture patient and of course such treatment is to be given during the convalescence period. Alternatively for all those who believe that schizophrenia is due to a regression of the ego—a mechanism understandable only in psychological terms and not in principle different from what is generally accepted as occurring in the neuroses, a regression which leads ultimately to a break with reality; for persons of such belief the psychotherapeutic approach must inevitably always take first place and all physical treatments if given viewed either as hindrances or helps to the psychotherapeutic process. This of course is the extreme analytic position. The third viewpoint, which I suppose the majority of us either accept or deviate from in one direction or another to a certain extent, is the compromise position. The schizophrenic symptomatology, the development and progress of the illness are understandable in psychological terms only. Such an illness differs in essentials from say a carcinoma of the kidney in being an illness understandable only in terms of the life-long series of interpersonal relationships in which the patient has been engaged. But there is more to it than this. The malignant depth of the regression, the progressive inaccessibility of the patient, the ultimate break with reality, these we perhaps believe will one day be shown to be due to hormonal balance changes, to defective homeostatic mechanisms within the nervous system, to asynchronous activity between nerve-net systems, say thalamo-cortical interaction or some such. Indeed behind this again we can detect the presence of the undoubted hereditary factor, perhaps the ultimate determinant of the issue—adaptive regulation or illness for many patients. But we are tired of saying to one another that schizophrenia is not a disease, is not an entity, that the organism works as a whole anyway, that aetiology is multiple, that there is no one cause and that it is nonsense to think of aetiology in terms of either physiogenic or psychogenic. From this dark night of the psychiatrist's soul, cybernetics comes like a new creed to bring peace to the afflicted. From this new doctrine you can be either a Freudian and treat your patient with analysis or alternatively give him insulin or E.C.T., or do a leucotomy without any troubles of conscience. But cybernetics has not helped the essential dilemma, which I think is this. It would be all right, or at least the issue could be postponed, if these methods of treatment really worked or if this is unfair, if we were really satisfied with the results. Dr. Mayer Gross, whose experience is second to none, in his report to the Psychiatric Congress in Paris in 1950 reported that 57 per cent. of schizophrenics of less than a year's illness were able to leave hospital after insulin therapy whereas 34 per cent. of the control group were able to do so. These figures are very similar to those given by many other workers and most are agreed that insulin treatment reduces the time spent in hospital. There is some doubt whether the treatment prevents, facilitates or has no effect upon relapses. It is not so important that 23 per cent. of schizophrenics are definitely helped by insulin therapy but that 43 per cent. of such patients, still in their first year of illness are not. Further the significant improvement in the immediate outcome for recent cases of schizophrenia given insulin therapy diminishes with time, if follow-up studies are made. There is really very little evidence that this treatment affects the ultimate prognosis of schizophrenia. No-one has suggested that cerebral surgery does so although all are agreed upon the usefulness of these procedures in controlling and ameliorating the effect of the psychosis in some patients. The position of E.C.T. is of course better, particularly for involutional melancholia, and for all depressions the results are just about twice as good as conservative treatment, but convulsive therapy has no influence in manic depressives on the tendency to relapse. It neither lengthens nor shortens the free intervals (Mayer Gross, 1951). Certainly there is evidence that E.C.T. shortens the duration of the individual attack and has transformed the outlook for the involutional patient. I have not quoted to you large numbers of figures related to this, but have given what I believe is the sober judgment of those who have had extensive experience of these matters. But a brief survey of the physical treatment literature shows, I think, some dissatisfaction with the results. This is seen in what amounts to a flood of new devices and new techniques, new combinations of the different treatments and the like. For example, there are new methods of inducing a convulsion, methods causing suppression of the motor effects of the convulsion, partial convulsions, electrical stimulation of the brain without a convulsion supervening, combinations of insulin coma and convulsions, insulin with intravenous sodium amytal or pentothal, insulin with corpus luteum hormone, insulin with fever therapy and many others. But the evidence is lacking that these new techniques materially alter the prognostic situation. I would like to emphasize at this point, in case I am misunderstood, that personally I think insulin coma therapy is the treatment of choice for many cases of recent schizophrenia, that E.C.T. is always indicated where possible for the involutional melancholic, and that the results of neurosurgery as palliative can be and often are excellent. But the all-over picture of these treatments viewed either practically or theoretically should give no occasion for complacency—indeed just the opposite. However, no-one has suggested that better results can be claimed for psychoanalysis, although it is clear that successful treatment of psychotic patients by psychoanalysis, despite Freud's views to the contrary, is being carried out in different parts of the world—such treatment is however usually a modified technique from the classical method.

Before proceeding to consider the psychotherapeutic position or rather the attitude of psychotherapists to these matters I would like to restate what seem to me issues which are or may be harmful to the future development of this subject.

Firstly: The extensive development of the three major empirical techniques, insulin, E.C.T. and surgery have led to an unpsychological attitude to the aetiology of the functional psychoses and for all those conditions for which these treatments are given. No matter how much of the symptomatology either physical or psychological, can only be understood in physiological or chemical terms, the individual patient's essential problem is always a psychological one. A piece of atrophied brain, a neoplastic growth, an abnormal metabolite, an epileptic explosion of a nerve-net system—none of these *of themselves* can give rise to what we call psychosis. This is suffered by the rest of the organism or by the environment in which it lives. Further it has often been pointed out that it is naive to assume that because a treatment of a physical nature has therapeutic value, the illness from which the patient suffered was necessarily physical in nature. If this were so the Lord Chief Justice who advocates flogging for delinquency would have to agree that this condition has an organic basis.

Secondly: The evidence is, I believe, that while these physical methods of treatment are often very valuable indeed, and are the best we have at our disposal, nevertheless there is a tendency to complacency about the results. The 43 per cent. of recent schizophrenics who do not respond to insulin should be borne in mind.

Thirdly: The very success of such methods, by its immediacy on a short term view, although not perhaps justified on a long-term view, and the wealth of experimental work related to these physical therapeutic methods, have tended to isolate the functional psychoses, particularly schizophrenia and manic depression from the main body of a psychologically oriented psychiatry to which most psychiatrists are adherent. This makes for artificial, contradictory and illogical attitudes in our thinking and finally in our therapeutic practice. There are indeed now two psychiatries, each unfortunately hostile to the other—but both trying to treat the same types of patient and both reporting successes and failures.

I will now turn to the question of the psychoanalytic attitudes to these matters. Most writers consider that the effects of the physical methods of treatment are due to the *psychological meaning* which the treatments have for the patient. For example shock treatment is thought of as a death threat to the patient, or as a punishment inflicted by the physician; leucotomy as a punishing mutilation and so on. These early views have been somewhat modified, but the affect aroused among psychoanalysts by these methods has been matched only by the hostility towards psychoanalysts among many of their colleagues of other persuasions. Dr. D. W. Winnicott in 1947 expressed himself very forcibly on these issues. He saw in E.C.T. "an escape from the acceptance of the psychology of the unconscious and from the implications of the psychological developments of the past 50 years". Leucotomy he described as the "worst honest error in the history of medical practice". He also suggested that these methods "express society's unconscious reaction to insanity" and that the good results obtained depend upon this—that "by them expression is given in an acceptable (because hidden) form to the unconscious distress society experiences in the face of mental illness". He pointed out—and here certainly many will agree with him—that "massive guilt feelings and fear and consequent hate are roused in people who are concerned with mentally ill persons . . .". To test opinion about the present attitude among psychotherapists to physical methods of treatment I circulated a letter containing 4 questions to 13 psychotherapists whom I selected as being very prominent and distinguished in their field. Ten letters went to Freudian, two to Jungian analysts, and one to an eclectic. This of course is not a statistical study—merely a kite to test the strength and direction of the prevalent mind. Eleven of my letters were answered and my correspondents impressed me by the thought, care and time they had given to my letter. I am most grateful to them. The questions were:

(1) Do you consider that the physical methods of treatment, including E.C.T., electronarcosis, insulin coma therapy and prefrontal leucotomy make psychoanalysis impossible or very difficult if these are given during the period of treatment?

(2) If these treatments have been given at some time in the past, does this fact constitute a contra-indication to treatment by psychoanalysis in the sense that they alter the prognosis for treatment?

(3) Are there theoretical reasons for considering such treatments as being harmful to ultimate psychological adaptation?

(4) Have you personal experience which would illustrate your answers to the first three questions?

While all my correspondents were at pains to point out that their experience related to these questions specifically was limited, certain clear attitudes emerged. Psychoanalytic treatment is regarded as impossible during the process of treatment by these methods, but in the case of E.C.T. if time is allowed to the patient for recovery from the memory defect psychoanalysis can perhaps be continued. On the other hand the process of E.C.T. would appear to reinforce *repression* and as a result psychotherapy thereafter would tend to remain at a superficial level. Two of my correspondents while emphasizing that the analytic process is impossible during such treatments, point out that conversely not to give psychotherapy of some sort is a grave error. This applies particularly to insulin therapy.

The majority opinion regarding the effects of such treatment on the prognosis for subsequent analysis was first, that leucotomy made it impossible—in fact constituted an absolute bar. This of course is the prevalent view of those who have written on the subject. Such patients are found to suffer from "an impaired capacity for emotional expression which precludes the capacity to face the realities of internal conflict in a manner required for psychoanalytic treatment" (Dr. R. Fairbairn). For other treatments the contraindication is less serious, although it is believed that all such treatments will affect the outcome of analysis. This might equally apply to all the failures of the physical methods. Of all the treatments E.C.T. is considered to affect the outcome of later deep psychotherapy least, and in fact analysts of the Jungian school are not averse to giving this or advising it during certain phases of a patient's illness.

It is impossible to give a summary of the answers to my fourth question which was a request for details of psychotherapists' personal experience which might support their views. It is clear however that, just as it is a familiar experience for psychiatrists to accept for treatment by one of the physical methods patients who have received periods of psychoanalysis or analytic psychotherapy, so also psychotherapists are approached by patients who have failed to respond to the physical methods of treatment. There is a two-way traffic in failure, but it is also true that psychoanalysts, particularly, tend to reject for treatment patients who have received but failed to respond to a physical method. The converse does not, I think, apply.

My third question: are there theoretical reasons for considering such treatments as being harmful to ultimate psychological adaptation? produced answers which seem to me to clarify the psychotherapists' attitude to physical methods. In general these methods are regarded as harmful because all of them tend to stabilize the patient at a low level or immature level of adaptation. Two important views emerged. One is that all these methods, insulin, E.C.T., surgery produce their effects by reason of the amount of brain damage they induce. In so far as these effects are irreversible thus far are their effects harmful. E.C.T. is perhaps least serious and could be compared, Dr. Gillespie suggests, to the effects of a sleeping draught or an alcoholic spree—a blanketing effect relieving the ego for a time from the tension produced by the pressure of internal excitations. This view that all these treatments are polite ways of damaging the brain and producing a fuddled partially amnesic and therefore comfortable state, can and should of course be challenged and I propose to return to it. The other, and I believe more important, attitude in answer to this question of mine is this. Many of my correspondents return again and again to the idea that what matters is not what is done to the patient *but how it is done* and this particularly applies to the treatment of psychotics. The whole question of the counter-transference—the hidden unconscious attitudes of the doctor towards his patient, which motivate his behaviour towards the patient and his responses to the patient's behaviour, this is the urgent preoccupation of all those psychoanalysts and Jungians who are now working on the psychotherapy of the psychoses. In connection with the physical methods, many of my correspondents refer to this issue. Dr. Winnicott regards E.C.T., for example, as a method providing a "way out" for patient and doctor from the basic anxiety and madness and the suicide moments, constituting "a blind co-operation of the doctor with the patient's suicidal urge". Dr. E. A. Bennet writes: "In my experience so much depends on how the treatment is presented to the patient and this is more important than the bare bones of the treatment itself. I believe that if E.C.T. for example is presented in a certain way it has no harmful effects. But if it is presented in a brusque manner and perhaps given rather badly, then I think the results would be less favourable." Dr. Michael Fordham writes: "I would emphasize the need for an examination of what the treatment means to the doctor. I think this important because as the result of analysing psychiatrists I conclude that physical methods you mention are often used in a defensive way by them and that the methods play upon complex patterns in the unconscious of which the physician is too often unaware. I take it this goes somewhere towards explaining the flagrant misuse of the physical treatments." Finally he writes: "Any objection I might have against the use of physical methods would disappear if I felt sure the motive for using them was 'all right'." Dr. Clifford Scott puts the matter from the patient's angle and from the effects on prognosis of a noxious countertransference: "The less justification a patient has for matching his own desires to produce pain, mutilation and confusion in other people's wishes (including those of his psychiatrist)—regardless of the degree to which the others who produced pain, mutilation and delirium justify their acts by the result, the more easy it would or should be to enable the patient to accept his own impulses and conflicts." Can we disregard these views, which are echoed in an increasingly large literature, as a product of the psychoanalytical philosophy, irrelevant to general therapeutic efficacy? I do not think we can. From the start of insulin therapy it was apparent that the psychological atmosphere of the unit was a factor of supreme importance in determining the results. It is not only the technical skill and self confidence of the doctor which permits him to deprive progressively lower and lower levels of his patient's brain stem safely to oxygen deprivation, but also his positive but permissive and accepting attitudes to the patient's behaviour which will influence his success. To what extent can he by understanding and empathy enter the terrifying world of unreality in the patient's ego and to what extent can he allay anxiety and draw that ego back to the reality from which it has broken away? Such abilities are perhaps an exceptional gift—not to be acquired—and the example of Dr. J. N. Rosen who claims good results with intensive interpretative psychoanalysis of schizophrenics comes to mind. Not everyone can acquire training in psychotherapy, but the question could be asked how much of this capacity is inherent, how much acquired? There can be no doubt that this ability exists. More important perhaps is the converse question: How much of the noxious effects on therapy of a neurotic countertransference can be avoided by intellectual insight —that is by knowledge of its existence?

To illustrate this point I would like to refer to a paper I found in the *Psychiatric Quarterly* (Jacobson, 1950). The paper is entitled "Psychodynamic modification of electric shock treatment". The author's theoretical attitude to E.C.T. is that "an explosion of cerebral energy brings about a restoration of mental health". He therefore probably relates E.C.T. action with abreactive or cathartic psychological techniques. But he states that "infantile conditioning, complexes, and malfunctioning which are presumed to underly mental illness have not been explored. Buried dynamic material has not been brought to consciousness. No 'depth psychology' is involved." He is very hostile to such "depth psychology" which he rejects. He considers that "the basic psychopathology is the distortion of personal orientation to the environment". He considers that ordinary E.C.T., as well as having a physiological effect, "introduces into psychiatric practice a tremendous pressure variant in the patient's environment". The modification of E.C.T. which the author practises is to apply a minimal current with the Liberson brief-stimulus apparatus which produces a disagreeable subjective effect without any change in consciousness. No convulsion in fact occurs. With an appropriate current, the musculature of the face is so contracted that speech is impossible. This is maintained for 5 seconds. During the subsequent minute the therapist gives positive suggestions to the patient and this is repeated on the single occasion as many as 10-12 times. The electrodes are arranged to produce the maximum pain and the patient is told that to the extent to which he is able by his own efforts to achieve the therapeutic goal the shock treatment would become unnecessary. The doctor constantly emphasized that he too wished to eliminate the necessity for further treatment, by developing within the patient a stabilizing factor that had been lost. By this means depressed, manic, paranoid schizophrenic, mental defective, alcoholic, epileptic and psychoneurotic patients were treated. The author feels that his modification introduced into ordinary E.C.T. what he called "a rationale which dignified its use". However, he found that the method "presents problems of adjustment for both patient and therapist". The relationship of patient to doctor, he writes, is greatly intensified. He called the treatment "psychodynamic electrotherapy" or as he preferred to call it PET. This "petting" must be extremely painful and the author prepares his ground by a dynamic or perhaps I should say a pseudodynamic study of the patient's life situation and problems. The patient's need for help and his embryonic transference relationship allows him to accept the pain. The author describes how he introduces his form of "petting" to the patient, to whom he says—"This treatment is going to be somewhat disagreeable. I do not want to hurt you more than I have to. I cannot give this treatment unless you co-operate. I am sure you want to get well, to leave hospital and go home. I will make every effort to reduce your discomfort to the minimum. You must endure the discomfort to the best of your ability." The patients often cried bitterly and one girl whom the author quotes said: "Oh, I know I have been a bad girl . . . but don't beat me again! I have been beaten enough in my life. My father used to beat me with a whip because I was a bad girl." The author remarks that she was abreacting her early experiences, but in others he found a masochistic response. One said, "It doesn't hurt. It feels good. I like it." Still others became wildly violent and panic-stricken and a few became apathetic and unresponsive. The author thought the treatment particularly effective in dealing with hostility in the patients. He states that "One directly confronts the patient with the fact of his *bad* attitude towards those about him and one continues to treat him until one is convinced that his attitude has changed, at least momentarily." It is necessary to add here that the author found that he could not dispense with orthodox convulsion therapy and that his "petting" was liberally supplemented by E.C.T. The terrible method advocated in this paper needs no further comment except this. Probably few could read this paper without recalling the mediaeval attitude of identifying illness with sin. The "bad" attitudes of the patient must be changed by pain and punishment. The patients' illnesses are still the same but modern society has buried much of its overt hostility, fear and guilt. We must be very careful to see that we do not use modern technology as a cover to express, however unconscious we may be of it, these concealed elements of ourselves and our society. It is necessary, I think, to consider very carefully not only the therapeutic efficacy but also the motivations which have led to the development of the great variety of new methods of "shock therapy" and of abreaction, and suspicion should be aroused whenever a new method or technique involves a patient in physical suffering over and above the mental suffering which is intrinsic in the case of a cathartic method.

I now wish to turn to the prevalent assumption among psychotherapists that these physical methods of treatment E.C.T., insulin and surgery owe their efficacy either to the cerebral damage they produce or to the strictly psychological effects in the form of a threat of punishment, death, assault, etc. I think there is enough evidence now to make both these assumptions unjustified. Time does not allow me to review today evidence which contradicts them, and certainly much of this evidence is known to you. Certainly some reversible or irreversible changes are produced in the nervous system by these treatments.

The use of preconvulsant anaesthesia with pentothal has not affected the efficacy of E.C.T. Steinfeld (1951) points out that although it may be argued that though the patient is then not consciously aware of the shock treatment, his unconscious still registers the occurrence. But such unconscious awareness of violence directed against the self cannot be perceived as punishment, because a participation of the conscious is equally necessary. Further Steinfeld—an unusual analyst who has given E.C.T.—states that "neither subsequent analysis nor interpretation of the patient's behaviour shows the presence of such prehension". There is I should have thought sufficient evidence to contradict the idea that these treatments act only by reason of the *meaning they have for the patient*. It would seem justifiable on the basis of the neurophysiological, anatomical and biochemical research on the effects of these treatments to suggest that changes are brought about within the physiological organization of the patient which themselves affect the position of the patient's ego. For example, Roth (1951) has shown that E.C.T. brings about a marked change in thalamo-cortical relationships—a change of a reversible and functional nature within mutually interacting systems of normal neurones. This is not the effect of a simple brain damage. E.C.T. moreover mobilizes those hypothalamic-endocrine systems which are concerned with the body's response to stress, whatever its nature—and there are many more.

The situation for insulin and cerebral surgery is equivalent. Hypoglycaemia, for example, besides depressing functions of the C.N.S. in an orderly manner down the neural axis from cortex to medulla, causes a progressive excitation of the autonomic elements within the brain, particularly those organized within the diencephalon. The repeated total discharge of these autonomic elements, which affect both the cerebral cortex by upward discharge, and the peripheral systems by downward discharge, mobilizes defensive or homeostatic mechanisms which as Gellhorn and others (Hill *et al.*, 1951) have shown are hyporeactive in many patients suffering from schizophrenia.

The relationship which a psychotherapeutic programme, whatever its nature, cathartic, analytic or educative, will have to a physical method of treatment and the influence which such treatment will have on the psychotherapeutic programme, is necessarily dependent upon a clear understanding of precisely what happens to the patient's ego-situation as a result of the treatment. If it is accepted that the psychological meaning which the treatment has for the patient is not *alone* or even prepotently the therapeutic weapon by which the physical methods work we can examine the views of those who take the matter further. Between 1940-1944, which in the U.S. was the time when the first great wave of enthusiasm for these treatments began to recede, a series of papers relevant to this appeared. Two contradictory points of view emerged. One was that in shock therapy the patients experience a release from the tyranny of the super-ego. As early as 1937, Jelliffe had expressed this view that such treatment was "an onslaught of the death instinct". The quite opposite view was also expressed. At this same discussion Glueck assumed that the forces of control and repression are strengthened in some unknown way. These contradictory views have been held since. Most of my contemporary correspondents, for example, emphasize that shock treatment *increases* repression so that the patient is less amenable afterwards to the analytic process. Weigert (1940) tried to reconcile these contradictions. In her view, as a result of study of patients undergoing E.C.T. and narcosis, the tyrannical super-ego is replaced by attacks from reality, and the ego tries to adjust to this reality more or less fortunately by new control and new repression. Since the patient's interest and attention is thus directed to reality again, he has a heightened readiness for transference, and an outward turning of libido. W. Abse (1944) in this country considered that convulsive therapy operates by reason of the fact that it is a danger signal, a potentially traumatic situation, calling forth anxiety and hence setting in motion the defences of *repression.* He wrote: "convulsive therapy is a reversal of psychoanalytic technique, since it leads to reinforcement of the most powerful mechanism of defence possessed by the ego, that of repression. This is not the most desirable, but it is an effective method of establishing a new equilibrium in the psyche. Repression is not more conducive to freedom in the economy of the mind than martial law is conducive to freedom in a country fearful of attack." By way of comment it may be said that if repression is the main or only mechanism activated by shock therapy it is indeed surprising that more cases of anxiety neurosis and hysteria are not benefited from it. Further we have to account for those not unusual patients whose psychoses are made worse by E.C.T., and then there is the undoubted fact that preconvulsive anaesthesia has taken much of the threat out of the treatment, although of course it is true that the physiological results within the nervous system are those of a response to a profound unspecific threat. What, also, are we to make of the observation that E.C.T. is sometimes followed by an abreaction and verbal release of hitherto unexpressed material?

This last observation has impressed many workers, both those who have approached it from the psychological and from the physiological aspects. E.C.T. is seen as catharsis, if not at a verbal-symbolic level, then at a visceral-motor level. It is well known of course that among institutionalized epileptics irritability, tension and aggressiveness is relieved by the advent of a convulsion. Indeed the best way to treat an epileptic with an early psychosis in which hostility is directed outwards, is to stop anticonvulsants and allow the subject to have some fits. In a few patients of my own whose epilepsy has been stopped by temporal lobectomy, the psychosis has increased and tension become so extreme that E.C.T. seemed a correct procedure and indeed this has proved the case in a few. From a different approach Lieberman and Hoenig working on observations made since the war in the insulin unit of the Maudsley Hospital have shown a significant relationship between the presence of epileptic symptoms during insulin coma therapy of schizophrenics and the likelihood of remission from illness. The occasion of frequent spontaneous seizures and myoclonic jerks during such treatment is of good prognostic omen. We understand epilepsy as a vast generalized discharge of the nervous system and it would be logical to identify this with the cathartic process at the psychological level, but this assumption cannot yet be made with confidence. Intrinsic to the mechanism of generalized epilepsy are discrete elements which have to be viewed differently. These are the observations on that type of epilepsy which affects thalamo-cortical relations; they can and frequently do occur without a general convulsion. The best example is the spike and wave phenomenon. It often seems that the occasion of this type of discharge supervenes at a moment of psychological tension and is a response obliterating consciousness at a convenient moment. Wayne Barker has demonstrated this effectively and it is common clinical experience. This is much nearer to what we understand by repression. My own EEG studies on schizophrenics have convinced me that the brains of some of the patients, particularly the catatonics, can organize themselves in such a way that epilepsy of the thalamo-cortical variety appears and that when this happens its significance can be understood as an intrinsic homeostatic defence. If such patients suffer a convulsion, that convulsion is observed to be beneficial to the patient. The matter in psychological terms can be viewed either way. It is both a discharge of excitation at a visceral-motor level and perhaps a method of repression. After it, the ego of the patient turns outward towards the environment and the transference relationship, previously impossible, becomes a possibility.

The point of view that I would wish to put before you then is that in convulsion therapy we are not only offering an assault on the patient's ego from external reality, but we may also be activating a mechanism inherent in every individual by which the ego can handle intolerable situations. This mechanism not only involves the discharge of dammed-up excitation but also strengthens the ego by increasing defensive repression. If this is so then the rationale of convulsion therapy is, as Abse believes, in direct opposition to the aims of any strictly analytic procedure. In analysis the transference is used to make the patient re-live his past affectively, the analyst using his knowledge to interpret to the patient in such a way as to increase his conscious control and awareness. The decision to give shock therapy is the admission on the part of the psychiatrist that this process is for his patient either impossible to achieve or too dangerous for the ego-stability of the patient. Having made the decision the psychiatrist hopes to discharge tension at a non-symbolic level (i.e. a visceral motor level) and to strengthen the ego by repression. The transference relationship which emerges must then be used, not to increase ego-awareness, which the treatment is aimed at diminishing, but for purposes of positive education in obtaining gratification from relationships in the patient's environment. To quote Abse: "Freud has stated that education can be described as an incitement to the conquest of the pleasure principle and its replacement by the reality principle; it offers its aid, that is, to that process of development which concerns the ego; to this end it makes use of rewards of love from those in charge, and thus it fails if the spoilt child thinks it will possess this love whatever happens and can in no circumstances lose it."

I will now turn to the operations on the frontal lobes. As you know these operations have aroused the greatest hostility from psychopathologists. I have already quoted Dr. Winnicott's view. It is particularly unfortunate that this hostility has appeared for the most part from those who have had the least experience of patients treated by surgery; in fact the basis for it lies in the philosophy of life which psychoanalytic theory provides. Dr. Jan Frank, whom many will remember when he worked in this country, is one of the few psychoanalytically oriented psychiatrists who have had extensive experience of leucotomy patients. Dr. Stengel is another. Frank writing from the States in 1950 deplores this emotional over-reaction among his colleagues which has expressed itself, he believes, in a conspicuous dearth of contributions to the theme in analytic literature. He is particularly surprised at what seems a lack of interest because these operations significantly interfere with psychic activity, causing thereby (to quote him) "a quantitative shift of instinctual impulsivity and changes in its psychic representations", and it alters certain facets of ego functioning. Frank agrees with Stengel (1948) when the latter wrote, "that the psychoanalyst believes in the power of love and reason. That is, he is fundamentally a strategist and feels about the more violent forms of physical treatment as a highly trained military strategist must feel about atomic warfare." But once again it seems that the preoccupation is with such treatments as causes of cerebral damage *only* and there has been a tendency to ignore evidence that demonstrates that over and above this there are specific changes in neural organization which modify the situation of the patient's ego. How is it that the ego state of chronic tension and preoccupation, which leads to psychotic or socially undesirable behaviour or to constant crippling neurotic defence, is reduced? Is it entirely a response of the ego to brain damage as Goldstein suggests, or is there something specific for ego-functioning in the severance of frontal thalamo-cortical interaction or in those cortical pathways involved in the activities of the visceral brain, which we can see at work in such operations as cingulectomy? We still do not know these answers, but in so far as a decision to perform a "psychosurgical" procedure is part of our psychotherapeutic programme, and I suggest that we should never view such a decision in any other light, then it is incumbent on us to consider such effects as are known very carefully. All psychoanalysts tell us that it is impossible to start or continue this form of psychotherapy after operation. The reason given is that free association, the basic rule of the procedure is impossible for the patient. It is impossible for him to see psychological connections, nor can he enter into a transference relationship in the usual sense. It seems that his ego-boundaries are constricted and narrowed: he is more egocentric, tactless, aggressive, demanding and searching to gratify his immediate needs. Frank (1950) considers that the lack of spontaneity and initiative of the leucotomized patient is not only a defect showing constriction of the ego, due perhaps to brain damage itself, but also a defence against the fearful experience of not being able to master reality. Goldstein also postulated that the change to concrete attitudes shown by the brain-damaged is a defence or protective mechanism of the ego. In a valuable and interesting paper Klein (1952) divided the post-operative symptomatology of his leucotomy patients into two groups. The first group included perseveration, inertia, verbosity, manic-like condition, associative poverty, disorder in thinking and conceptual weakness. These symptoms were variable and not always present. They were related to the immediate post-operative state and less permanent. The second group of symptoms constituted a more permanent change in personality and were found in all patients studied. Among these the most important in Klein's opinion was the *discontinuity in the pre-operative ideation*. To quote him: "We may assume that there is in normal persons as well as in well-integrated psychiatric patients a basic attitude, which arises from past experience, and is partly organized and partly fluid. Its organization and synthesis to a definite pattern peculiar to an individual may be called the ideatory scheme. When mental activity involving approach and conduct takes place, this scheme is activated so as to form the ground on which mental process may progress, securing thereby the continuity of the personality. This process has been profoundly altered in our patients." Klein likens the *ideatory scheme*, which he suggests is dependent upon frontal thalamo-cortical connections, with the body scheme which is dependent upon more posterior but similar connections. He believes that when the ideatory scheme is blocked and the "flow of fluid background material reduced, there is no material from which to build up or elaborate the situation to a problem stage". Therefore no tension can arise. This ideatory scheme, postulated by Klein, is distinct from other preconscious and conscious functions such as memory, intellectual capacity and so on. It would seem to be a functional organization in which the meaningful events of the external world are related to the internal world of tensions and instinctual excitations, and the product so activated presented to the ego. Without it the ego is able to ward off such excitations, or as Frank (1950) put it the forebrain is "an important instrument of the preconscious system". There is an emotional "asymbolia" caused by lobotomy "which drains away a psychic dimension". Whatever our theoretical construct about these operations may be we are left with the evidence that quite apart from the psychosis and all the faulty behaviour patterns which have resulted from it perhaps over many years, the patient who has been subjected to a surgical procedure of this type is a potentially lesser person. Psychotherapy, certainly of the analytic and probably of the cathartic variety, will be for him impossible. Surgery will in fact have burnt the psychotherapeutic boats. But educative and occupational psychotherapy, persuasion and the re-establishment of normal and socially desirable methods of obtaining gratification of needs are necessary and are all that are possible. Lastly there is general agreement that if the therapeutic goal is to secure the discharge of any given patient from hospital, then there is an absolute necessity to establish that there exists supporting and accepting attitudes in the family to which the patient is to be returned. The patient who has no one to accept him after operation cannot make an adjustment outside hospital.

I would like now to summarize the main points which I hope will emerge from this rather diffuse discussion of my subject.

(1) E.C.T. and cerebral surgery, and probably insulin coma therapy stand apart from the other physical methods of treatment since the latter's sole function is in the facilitation of a psychotherapeutic technique of catharsis. The former group, however, act in direct opposition to those processes which are usually regarded as psychotherapeutic—namely the increase of ego-awareness and control. As a result of psychosurgery it appears that the ego is protected from the onslaught of excitations against which it has either failed to adapt or made a constant maladaptation. The price paid is a narrowing or constriction of ego-boundaries and in some degree the patient thereafter is a lesser person in psychological potential, with diminished capacity for self-awareness and for the depths of emotional experience. E.C.T. also reduces self-awareness and for a variable time after treatment reduces the capacity for developing it, but also there is the possibility that in addition to a *repressive* mechanism, a discharge of tensions at a visceral-motor level is achieved during treatment. Less is known about insulin therapy, but the effects may be similar. The price paid by the ego in these treatments seems small indeed when it is put against the continuance of an intractable and disabling mental disorder, but this statement only is true when the treatment offers a real chance of recovery or amelioration.

(2) These considerations do not invalidate these procedures in any way, nor can they detract from their usefulness, which is firmly established. But the results are too uncertain to warrant complacency, and this suggests that greater attention should be directed to the psychological consequences and the way in which such treatment will affect any given patient. To do this a study of the psychological structure and the psychopathology of every patient is as necessary before the decision is made to exhibit one of these treatments as the recognition of any constellation of symptoms in a patient.

(3) There is a risk that a psychiatry dominated by physical methods of treatment, and promoting little but physiological research related to them, will regress to unpsychological attitudes to mental disorder such as existed at the beginning of the century when Kraepelin had laid the foundation of his descriptive work.

(4) Study of the analytic literature suggests that the psychiatrist's counter-transference may often play a part in the choice of, and the manner in which a physical method of treatment is given. The counter-transference may have serious consequences for the patient, and seriously militate against the success of such treatment even if it does not cloud the judgment and objectivity of the psychiatrist to the patient's detriment. The enormous elaboration of new techniques for abreaction and shock suggest here and there, that such developments may not be free from the influence of such noxious counter-transference.

(5) It is surely most harmful to our subject that the present situation of two

psychiatries each hostile to the other should continue. Those trained in psychopathology work for the most part outside mental hospitals; those trained in the physical methods of treatment work for the most part in mental hospitals. An adequate basic training in psychopathology for every psychiatrist would go some way to alter this, but the inclusion on the consultant full-time staff of every mental hospital of such a person would be an immediate measure worth considering.

(6) If the results of the physical methods of treatment, particularly those used for schizophrenia, give no reason for complacency, we can also view with dismay our inability to select with any degree of confidence those patients who will benefit from such treatments. It is possible that one of the reasons for this is the predilection for using symptom-groupings as the basis for choice and the neglect of the patient's problem as essentially and always a psychological one. As Sargant and Slater put it "Psychotherapy should indeed precede, accompany and terminate physical therapy."

(7) The prevalent opinion among psychoanalysts and Jungians that these treatments act either by reason of the meaning they have for the patient in terms of punishment and assault, or by reason of the simple brain damage they produce is not supported either by clinical or physiological research.

(8) A more realistic acceptance on the part of psychopathologists of the immense burden of the mentally ill on the community and the pressure in terms of time and demand which this brings upon their psychiatric colleagues would lay the grounds for a rapprochement. We are in this respect, I believe, a long way behind the United States.

I appreciate that having put myself in the position of one who has taken some shots at both sides in what has often been a most disagreeable contention, my views are unlikely to find favour with either side and in so far as I have been able to produce any argument at all this can be attacked from either side. My only reason for boldness is the dismay which I feel at the possible continuation of the present state of affairs. My wish, like that of everyone present, is to see a psychiatry which is one and undivided and which, to my way of thinking, must be one which is fundamentally psychologically oriented.

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HISTOLOGICAL CHANGES IN THE BRAIN AFTER UNCOMPLICATED ELECTRO-CONVULSANT TREATMENT

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THERE has been much discussion about the possible occurrence of reversible and irreversible histological changes in the brain following the convulsive treatment of mental disorder. Most investigations have been carried out either on experimental animals—with results not easily comparable to man—or in deceased patients in whom the picture is usually obscured by the presence of complications. The various causes of death following convulsive treatment have recently been reviewed by Maclay (1953).

The two cases to be described here are remarkable for the relative absence of such complications so that they are in some ways unusually suitable for the investigation of any possible effect of convulsive treatment on the histological structure of the brain.

CASE REPORTS

Case 1.—C.H., the patient, a girl, was first noticed to be behaving oddly at the age of twenty. At that time—in 1940—she became dreamy and suspicious; she would laugh to herself and wander aimlessly about the house at night. The father reported that during this period she "collapsed" three times in the street but no spontaneous attacks were observed subsequently and it is extremely unlikely that those described were epileptic in nature. She was examined at the Maudsley Hospital and was admitted to St. Ebba's Hospital with the diagnosis of early schizophrenia.

At St. Ebba's Hospital she had two electrically induced convulsions. She stayed for one month and left only slightly improved. She was then admitted to Bexley Hospital in December, 1942. The E.C.T. was continued, at first with striking success. She received during 1943 and 1944 about 85 electric shocks. In June, 1944 she was by no means well but was still able to work in the laundry and at her own request she was discharged. Within a short time however she relapsed and during the following year she was a patient in St. Crispin's Hospital, Northampton where she also received electro-convulsant treatment. Then, after a further period of improvement, she was re-admitted to Bexley Hospital in a very deteriorated condition, semi-stuporose, noisy, resistive and dirty in habits. She often had to be tube-fed. In April of the following year her physical condition was described as satisfactory but on May 13th she was found to be suffering from cystitis which was successfully treated with sulphathiazole.

On 19.v.47 intensive E.C.T. was begun with premedication of omnopon 1/3 gr., scopolamine 1/150 gr., atropine 1/100 gr. and tubocurarine 14 mg. Five shocks were given on this day within one and a half hours, the last three being accompanied by increasingly intense clonic movements especially of the upper limbs, Respiration was satisfactory throughout; the deep reflexes of the limbs were not abolished during the treatment. On 21 May another treatment was started. She had her first convulsion quite successfully but before the second was induced her respiration became weak and despite oxygen she collapsed and died.

Altogether from 1942 to 1947 about 140 seizures had been induced. The patient was 27 years old at death.

Previous History. A normal birth. The patient was the fourth of seven children, all of whom are healthy. At school she was average, leaving at the age of 14. Since that time she had held various jobs as shop assistant, munitions worker, etc.

Post-mortem Examination. This was carried out 24 hours after death by the Coroner's pathologist who found nothing abnormal except dilatation of the right ventricle of the heart and congestion of the small cerebral vessels. The sliced brain was fixed in 10 per cent. formalin and sent to the Department of Neuropathology at the Maudsley Hospital. No additional observations were made.

Histological Examination. Sections of heart muscle, liver, spleen and adrenal gland showed mild post-mortem change. In the kidneys there were a few patches of very slight interstitial lymphocytic infiltration. The glomeruli were normal, the tubules showed post-mortem change.

The main finding in the central nervous system was that of a glial fibrosis in the marginal layer of the cortex. It was present in all cortical areas examined but was most marked in the frontal and occipital regions (Figs. 1 and 2). It was also seen around the ventricles and in the marginal areas of the brain stem. Wherever it was found it consisted of a dense network of glial fibres which stained well both with Holzer's stain and with Mallory's phosphotungstic acid haematoxylin. In cortical areas, particularly in the occipital region, the glial fibrosis often extended from the tangential layer into layers 2 and 3.

There was also a definite glial fibrosis in the white matter. It was often patchy and confined to the perivascular spaces, but both in the frontal and occipital white matter it was more extensive. Patchy fibrous gliosis was also seen in the pons.

The gliosis was so well organized in most places that its date of origin was definitely before the beginning of the intensive treatment. While it is always difficult to assess the age of glial changes it is possible that some of it may have been several years old. There were other parts however, especially in the white matter, in which the production of glial fibres was of more recent origin. This might have been caused by the intensive treatment of 19 May.

In Nissl stained sections the molecular layer of the cortex, and the white matter, were more cellular than normal. In the molecular layer the cells consisted mainly of astrocytes and a few proliferated microglial cells. There was no activation of the macro- or microglia within the cortex either in Nissl preparations or in silver impregnations.

The cytoarchitecture as a whole was preserved. There was no appreciable loss of nerve cells but these did, however, often show a loss of polarity and varying degrees of chromatolysis. The amount of lipoid material both in the nerve and glial cells was not increased.

The white matter revealed an abundance of metachromatic bodies but these were probably due to post-mortem change. There was also in places some distension of the Virchow-Robin spaces, possibly indicating terminal oedema.

The meninges showed slight patchy thickening and contained many distended blood vessels. The walls of most of the meningeal vessels and of the vessels within the brain substance showed a very mild degree of adventitial fibrosis.

Case 2.—E.S., the patient, a man, was first admitted to hospital in 1943 at the age of 32. At that time he was a private in the Army, although until he had enlisted in 1940 he had been an assistant art editor to a daily paper. In the months before his admission he had become increasingly solitary, suspicious and deluded. No further details of this episode are known but after five months he was discharged from the hospital and from the Army showing definite signs of improvement. Two months later he was admitted to Runwell Hospital with the diagnosis of schizophrenia simplex. He was mysterious, vague, and mildly grandiose. He expressed ideas of reference; he was not apparently hallucinated. There was no physical abnormality.

From this time on his mental condition fluctuated sufficiently to allow his discharge and re-admission on four occasions but his clinical history was one of gradual, but never extreme, disintegration. During the next few years of his illness he received two courses of insulin treatment (a total of 105 comas). In 1947 he underwent his first course of intensive electro-convulsant treatment and from then until his death in 1951 he had a total of 38 grand mal and 7 petit mal seizures, with two to four of the former at each sitting.

The first course finished satisfactorily in 1948, the second was given in 1949, again with good results but by 1951 his condition had deteriorated sufficiently to warrant a further series. On the first day he was given three shocks resulting in three grand mal attacks but shortly after the last he became pale and pulseless, he started sweating and then his breathing stopped. Artificial respiration was begun at once and continued for an hour and a half, interspersed with the administration of oxygen and coramine, but he did not respond. His age at the time of death was 40.

Throughout the entire series of treatments the voltage ranged from 120 to 150 and the time from 0·3 to 0·7 seconds. No relaxant drugs were used at any time.

Family History. He was the elder child. His parents and his sister showed no abnormality. His maternal grandmother and a maternal uncle committed suicide.

Post-mortem Examination. This was carried out 48 hours after death by Dr. D. C. Caldwell to whom we are very grateful for the summary of his report:

The body of a well-nourished man. Pericardium normal. Marked right sided dilatation of the heart with some dilatation of the left ventricle. The auriculo-ventricular rings were dilated. The coronary vessels were normal. Bloodstained mucus in the bronchi, the lungs were well aerated. Bloody mucus in the stomach; there was some congestion of the gastric mucosa at the cardiac end with multiple petechial haemorrhages. The liver, spleen and kidneys were greatly congested. The brain also appeared to be very congested, this being especially noticeable in the small vessels of the white matter. Other organs appeared normal. The cause of death was right ventricular heart failure occurring during electro-convulsant treatment.

Histological Examination. There was slight patchy fibrous thickening of the leptomeninges over the convexity of the brain. The meningeal blood vessels were grossly congested and in

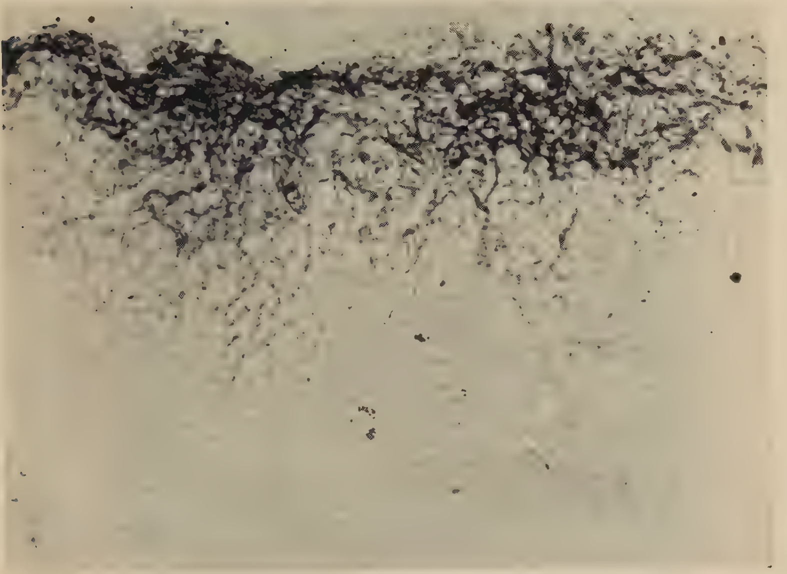

FIG. 1.—Marginal gliosis of the frontal cortex. Holzer stain. ×470.

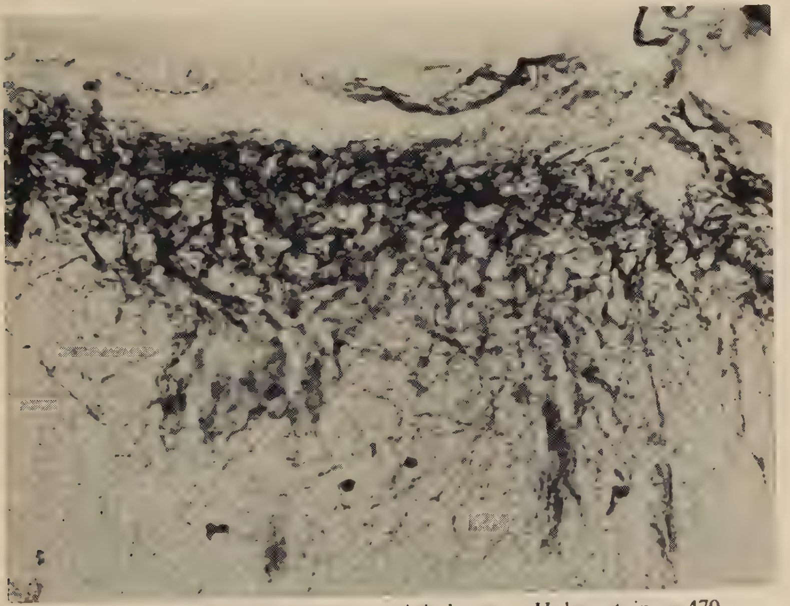

FIG. 2.—Marginal gliosis of the occipital cortex. Holzer stain. ×470.

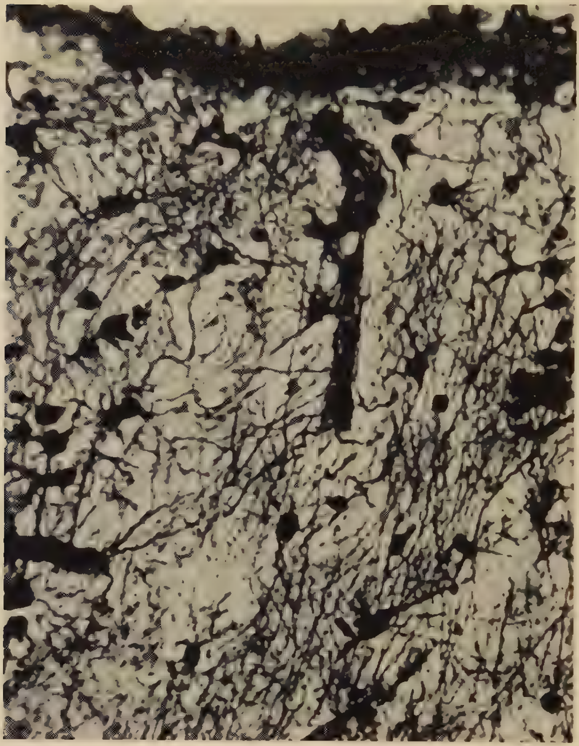

FIG. 3.—Marginal gliosis in the occipital cortex. Hortega's silver carbonate method for astrocytes. ×460.

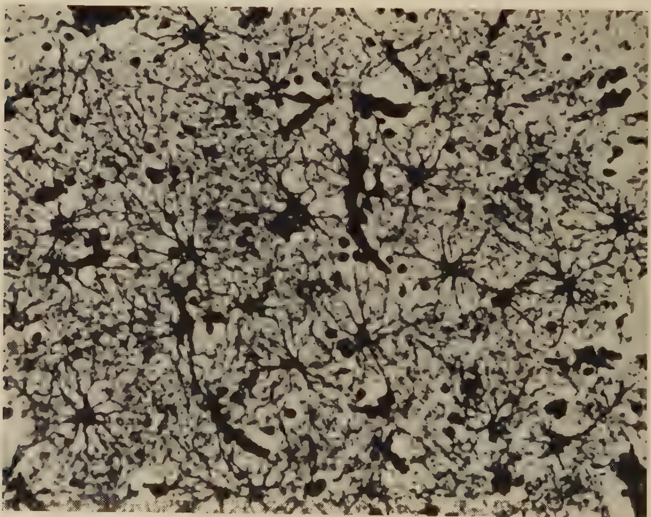

FIG. 4.—Increased number of proliferating astrocytes in the white matter of the frontal lobe. Hortega's silver carbonate method for astrocytes. ×230.

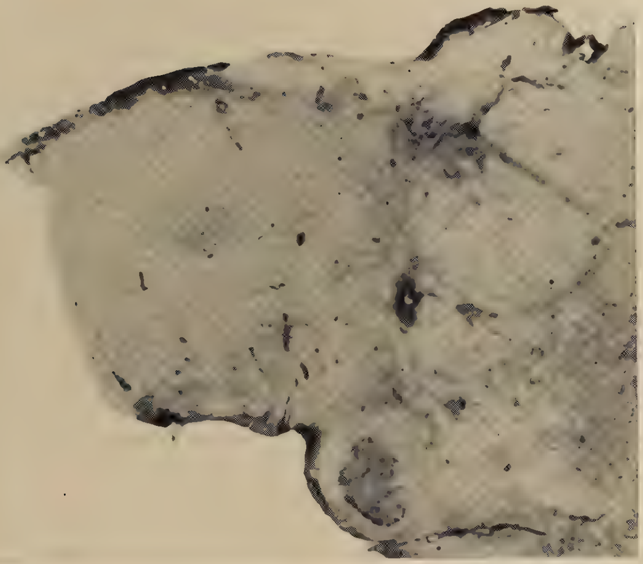

FIG. 5.—Marginal gliosis and scattered patches of gliosis in pulvinar and brain stem. Holzer stain. ×5.

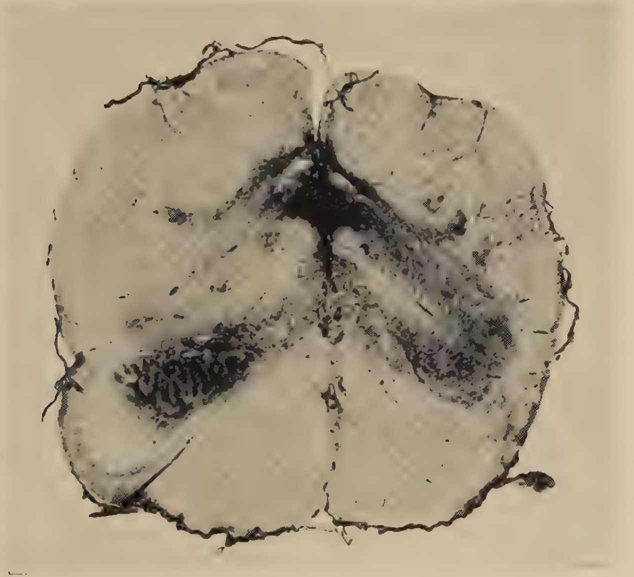

FIG. 6.—Marked glial fibrosis of the medulla. Holzer stain. ×7.

some places, over the frontal and occipital lobes especially, there appeared to have been an occasional small haemorrhage. In the cortex and white matter there was also gross congestion of the blood vessels and occasionally the perivascular spaces were distended and contained many red cells. In van Gieson and iron haematoxylin stained sections the adventitial coats of the small vessels often were unusually thick and fibrous, especially when situated around the depth of a sulcus.

In the frontal, central, temporal and occipital regions there was some marginal proliferation of astrocytes and a fine glial fibrosis extended down into the second and third layers of the cortex (Fig. 3). At the junction of the cortex and white matter, as well as more deeply in the latter, there was also an increase both in the size and in the number of astrocytes. In cresyl violet stained sections the cell bodies often showed up faintly and contained large pale nuclei. In sections stained by Holzer's method and in silver impregnated sections there was a mild but definite glial fibrosis within the white matter but concentrated more especially around the vessels (Fig. 4).

The sub-pial surface at the base of the brain, around the optic tracts, and the laminae spreading up between the divisions of the pallidum were quite heavily gliosed (although this region is particularly susceptible). There was some patchy perivascular gliosis affecting the thalamus and brain-stem (Fig. 5). Both the sub-pial surface and the sub-ependymal zone of the mid-brain and pons were mildly affected but the gliosis in the medulla was more severe (Fig. 6). From the rostral to the caudal limits of the inferior olives a glial fibrosis was seen stretching across the floor of the fourth ventricle, through the reticular substance and into the olives themselves.

Nerve cell changes were not prominent and no areas of general or localized loss of cells were noted. There did not appear to have been any appreciable damage to the myelin sheaths and fat staining did not reveal any abnormal amounts of sudanophil material. The axis cylinders appeared normal and no microglial proliferation was observed. Both the cornu Ammonis and the cerebellum appeared normal although in the former the congestion of the blood vessels was exceptionally well-marked.

Discussion

The histological findings in the two cases described in this paper can be summarized as a mild marginal gliosis over the surface of the hemispheres and a moderate diffuse or perivascular proliferation of astrocytes in the white matter. The small blood vessels in the meninges and the substance of the brain were also slightly fibrosed. The changes were thus similar to the findings of glial proliferation which one encounters in the majority of epileptic brains. Appreciable focal or diffuse loss of neurones was, however, nowhere noted. In particular, the vulnerable Sommer sector of the cornu Ammonis and the Purkinje cell layer in the cerebellum were found intact. Since such lesions tend to occur with particular frequency in the more severe cases of idiopathic epilepsy showing a tendency to status, their absence in our two cases can be taken as an indication of the mildness of the lesions. In neither of our patients was there any clinical change which could be related to the lesions in the brain. Both patients were, however, deteriorated schizophrenics in whom it would be difficult to ascertain minor temporary or permanent psychopathological changes. In the second case there was the additional factor of insulin treatment. There is evidence to suggest however that those glial changes that may be found after such treatment are mainly dependent on the occurrence of epileptic fits (MacKeith and Meyer, 1939) and in this case none occurred.

Most of the histological changes were undoubtedly established some time before the particular convulsion which ended in death. They are not, therefore, of themselves the immediate cause of this—which in the first case was respiratory failure due to curare and in the second, right ventricular failure. It is not, however, with the cause of death that we are here concerned, but rather with the possible relation of the treatment to the histological picture. Before this relationship can be estimated it is necessary to discuss briefly other possible causative factors.

In the first place it should be remembered that mild proliferation of the glia and fibrosis of the vessel walls occur as a physiological concomitant of higher age (Gellerstedt, 1933; Baker, 1937). However, both of these cases were below the age group in which such physiological, especially glial, changes tend to manifest themselves to any appreciable degree. Nevertheless, as the second case was 40 years old at death we investigated the brains of another ten patient aged between 40 and 50 but who had not received convulsive treatment. In none of these was comparable proliferation of glial elements encountered and it seems justifiable to conclude that the age of the patient did not materially contribute to the histological picture.

Secondly, both patients suffered from schizophrenia, a condition in which histological changes have been described by a number of workers. However, these findings have never been generally accepted as the substrate of the schizophrenic process (cf. the excellent review of the problem by Wolf and Cowan, 1952). The changes reported are not consistent and if present are more likely to be due to incidental causes including age, complicating disease or the physical effects of severe psychotic disturbances than to be the substrate of the primary disease. This was also the impression gained from personal investigations by one of us which have been communicated to the 1st International Congress of Neuropathology (Meyer).

Moreover, glial proliferation of the degree and distribution found in our two patients was not a common feature in the earlier histological research on schizophrenic brains. They were, however, a prominent finding in the brains of ten schizophrenic patients recently investigated by Winkelman and Book (1949). Closer scrutiny of this paper suggests that incidental factors may have been significant in the majority of their ten cases: their case 9 had been submitted to 111 electric shocks, case 7 had bilateral chronic pyelonephritis, case 6 suffered from several episodes of congestive heart failure; cases 2 and 3 exhibited early arteriosclerosis.

There have been a number of reports of atrophy of the brain in schizophrenics disclosed by macroscopic inspection during leucotomy (Puech, 1949; Pool, 1949) and pneumo-encephalography (Donovan, Galbraith and Jackson, 1949; Meschan and Scruggs, 1951; Huber, 1953). The significance of these findings is however not yet established; apparently no histological confirmation has been obtained in individual cases. There is some indication that the pneumo-encephalographic picture does not indicate an atrophy in the accepted sense. We may be dealing with constitutional variants of the ill-defined ratio between skull capacity and brain volume and with fluctuations of brain volume in different patients and at different times in the same patient (Meyer and McLardy, 1950).

From all this the conclusion must be drawn that in our two cases the likelihood of the glial changes being a manifestation of the schizophrenic process is slight and that consideration of their possible relation to the preceding physical treatment is therefore necessary.

There is no uniformity in the literature as regards the causation of irreversible brain changes by uncomplicated convulsive therapy. The fatalities that have been reported are in almost all instances caused by complications, particularly cardio-vascular disease. Most reviewers, including Alpers (1946), Karliner (1948) and Will, Rehfeldt and Neumann (1948) are of the opinion that irreversible damage is not likely to occur in the majority of cases in which complications are absent. Investigations of biopsy specimens is difficult owing to fixation artefacts and to the very limited material available to the histologist.

Glial proliferation has been a prominent feature in several reports on the sequelae of convulsive treatment. Weil and Liebert (1940) examined the brains of six psychotic patients after Metrazol treatment and described findings similar to those in our cases. Ebaugh, Barnacle and Neuberger (1943) found among other abnormalities considerable stimulation of astrocytes, but as their patients were both aged 57, the age factor has to be considered. Zeman (1950) described—apart from widespread glial proliferation—necrosis of Purkinje cells in the cerebellum and of the Sommer sector in the cornu Ammonis. His cases were, however, complicated either by endocarditis or by severe lung infections, which may well have aggravated any anoxia caused by the preceding therapeutic convulsions. Wolf and Cowan (1949) described widespread astrocytosis in biopsies taken from two treated cases. The same change was however seen in a third untreated case while it was not found in a number of cases previously treated by E.C.T. Messimy and his collaborators (1951) discussed the role of previous insulin and convulsive treatment in the interpretation of glial changes which they observed in biopsy specimens taken from schizophrenic patients.

Experimental investigations have been undertaken on a fairly large scale. The results have been conflicting owing no doubt to the differences of species and experimental techniques employed by different research teams. Where experimental conditions approximated to those employed in human therapy histological findings were either negative or negligible (Cerletti and Bini, 1940; Barrera and associates, 1942; Winkelman and Moore, 1944; Alexander and Löwenbach, 1944; Siekert, Williams and Windle, 1950), or they were not severe (Neuberger and associates, 1942; Lidbeck, 1944; Ferraro and Roizin, 1949). The problem has been exhaustively discussed by Hartelius (1952). This author, after carrying out rigidly controlled investigations in cats found that significant changes in the nerve cells, blood vessels and the glia (particularly the oligodendroglia) occurred although incomparably the greater proportion of these was thought to be reversible. According to Hartelius, the direct deleterious effect of the electric current upon the tissue is negligible in therapeutic dosage. The lesions are caused by functional vascular disturbances and anoxia associated with the convulsion. Anoxia has an early effect upon the endothelial cells of the blood vessels followed by increased permeability and oedema. The occurrence of oedema in the course of epileptic convulsions is in accordance with bioptic observations (Penfield, 1936).

All Hartelius's animals (in common with those in most other experimental investigations) had only a short survival period. It is interesting that Ferraro and Roizin (1949) who investigated monkeys after a longer survival period described glial proliferation very similar in appearance and distribution to that found in our cases.

The general conclusion from this survey of the literature is that irreversible sequelae of electrically provoked convulsions are infrequent and that if they do occur they are not severe, probably even less severe than after convulsions caused by Metrazol and similar chemical substances. Their occasional occurrence cannot be denied, however, particularly if the number of electric shocks had been very large or shocks had been given (as is done in the so-called intensive treatment) in rapid succession, thus approximating to the events of status epilepticus which is well known to cause more severe sequelae than single seizures. Since frequency and intensity were both marked in our two cases the occurrence of a mild marginal gliosis and patchy astrocytosis of the white matter should not cause surprise.

This view is in complete agreement with that of Scholz (1951) who saw no reason why electrically induced convulsions, particularly if they were frequent, should not cause the same type of histological sequelae as is observed after spontaneous epileptic convulsions.

The absence of necrosis in the grey matter particularly in the cornu Ammonis and cerebellar cortex indicates, as stated above, the mild degree of the lesions. Such slender histological findings should not, of themselves, be allowed to discredit this form of treatment nor do they provide evidence that this treatment could be the cause of atrophy of the brain.

Summary

Two cases have been described in which irreversible histological changes in the brain may have been caused by preceding heavy electro-convulsive treatment. The changes consisted mainly of a proliferation of the marginal glia and of the glia of the white matter. They were thus similar to the pathological lesions known to occur in idiopathic epilepsy but they were not accompanied by loss of nerve cells in the cornu Ammonis or in the cerebellar cortex.

The changes were mild in spite of an unusually heavy shock treatment. It is emphasized that even such slight changes are by no means common after this form of treatment.

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EXPERIMENTS ON THE RATIONALE OF THE SZONDI TEST

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INTRODUCTION

THE purpose of this paper is to investigate one of the basic assumptions of the Szondi test, namely, that in selecting pictures in the test subjects tend to assign consistent meanings to the pictures, although these meanings are not explicitly stated. In the following experiments, this assumption was tested by obtaining *explicit* reactions to the pictures in the form of identifications, using two different experimental methods. Similar studies have been made by Klopfer and Borstelmann (1950), Rabin (1950a), Fosberg (1951), Davis and Raimy (1952), and by Dudek and Patterson (1952). In all these investigations, American subjects with some experience of psychology or psychiatry were used. The most extensive work was done by Klopfer and Borstelmann, who used a sample of American psychology students, and suggested that their methods might be employed on "other segments of the population". In the following experiments, their methods have been largely adopted for English subjects, of varying ages and occupations, including students.

It was realized at the outset that if it was found experimentally that consistent identifications were found for any or all of the Szondi pictures, such a finding would still throw no light on the mechanisms of choice involved in the ordinary administration of the test, as formulated by Szondi (1952) and Deri (1949). Deri, the main exponent of Szondi's theory and practice, finds it unnecessary to include Szondi's own genetic assumptions in her account of the rationale of the test. Instead, she hypothesizes that people have latent tendencies towards certain mental diseases, which show themselves in certain personality characteristics; these tendencies are responsible for the choice of particular pictures.

It is difficult to conceive of workable experiments that would either affirm or deny Szondi's or Deri's suppositions about the factors determining choices. Wallen (1951), made an initial attempt to tackle the problem experimentally by analysing one possible factor involved in choosing, namely that of facial clues and characteristics. This factor may be of some importance in explaining the results to be described, although it has not been examined specifically. The main value of the present investigation lies elsewhere, and is twofold.

Firstly, it suggests that the extent to which correct identifications are found for the pictures indicates the relative degrees of assurance a tester might adopt in scoring particular pictures or groups of pictures. Secondly, as Rabin (1950a), pointed out, such a study indicates efficiency of judgment in the identification of diagnoses based entirely on photographs, divorced from all the verbal and kinaesthetic clues provided by "live" patients. The first outcome should have important bearings on the validity of the test per se, and the second may suggest interesting implications for constructing procedures for the identification of pathological states, and hence may be of value to clinical psychologists.

METHODS AND PROCEDURES

Two different methods and procedures were adopted to discover the way subjects interpret the Szondi pictures. These are named (*a*) the Description Method, and (*b*) the Matching Method.

(*a*) *Description Method*

The cards were allotted numbers from 1 to 48. Each subject was given a complete set of pictures and asked simply to write down what sort of person he thought was represented in each photograph. No limit was set to the length of the description or to the time taken to complete the experiment. No further attempt was made to explain the nature of the experiment, as it was regarded as a self-evident puzzle, wherein the "true" personality was the correct answer. The experiment was completed in one to four sittings with each subject. Occasionally, several subjects were engaged on the experiment at one and the same time, so that the order in which the sets were presented varied from one subject to another.

This method is similar to the "free association" method used by Klopfer and Borstelmann (1950), except that an attempt was made to control subjects' responses to the extent of discouraging irrelevant questions and comments from subjects, in order to facilitate scoring. It should be noted that Szondi himself used an association method to discover the stimulus value of his pictures. But he failed to specify the number and kind of subjects who provided the associations.

The "panel" rating of responses, used by Klopfer, was not possible in this experiment. Instead, a single judge was used who classified each description to fit the rationale of one of the eight Szondi factors. This did not proceed by the progressive elimination of factors, set by set. The order of presentation was randomized so that each description received a separate and distinct evaluation. If a description failed to suggest any one of the eight factors, no evaluation was made. A total of 943 out of a possible 1,029 descriptions were scored as suggesting one or other of the eight factors, leaving 86 unclassified responses.

(*b*) *Matching Method*

This procedure was devised as a means of countering the subjective judgments involved in the previous method, and for the purposes of easier quantification. Three separate tests were given to three groups of subjects. A checklist was cyclostyled which contained eight personality descriptions to match the eight Szondi factors. These descriptions were substantially the same as those worked out by Klopfer. They were modified only so as to replace certain obvious Americanisms by their colloquial English equivalents. The checklist had blank spaces opposite each personality description, and subjects were told that they would be shown 48 photographs, each one of which had been given a number from 1 to 48. They were to look at each picture for 30 seconds, and then place it in one of the eight categories, according to their impression as to the sort of person he or she was. Five minutes was allotted initially for subjects to read over the descriptions. The pictures were then projected episcopically on to a screen. The final result was that each subject had 48 numbers written on his form, and the matching process could then be directly and objectively scored in terms of success or failure, according as the numbers were correctly or incorrectly allotted to the personality descriptions.

Statistical Methods

Statistical analyses of the number of pictures correctly identified in the description and matching experiments are contained in Tables I and II. Each factor is considered separately. The total number of pictures placed by subjects in each category or Szondi factor is given, together with the proportion of these placings which agree with Szondi's diagnoses, expressed as percentage values. The probability that the total correct identifications for any given factor exceeds the number of correct identifications that would be expected by chance is calculated by working out the binomial distribution for each factor. The probability that a given Szondi factor will be correctly identified by chance is 1/8 or 12·5 per cent.; the probability that it will be incorrectly identified is 7/8 or 87·5 per cent. Therefore, the mean and variance of the binomial distribution can be calculated. The difference between chance and observed frequencies is divided by the standard deviation, which gives a figure for c—the normal deviate. The resulting P is obtained from tables given by Mather (1943).

Table III gives the analysis for each picture within each factor for both methods. Here again, the probability that a given picture will be correctly identified by chance is 1/8 or 12·5 per cent. The obtained percentage of correct identification for each picture is given, and is seen to be either above or below the percentage expected by chance; but the numbers involved are too small for P to be calculated. The table is sufficient to show the relative success with which different pictures were identified. In many cases, the percentage values show such clear differences that no further statistical refinements are needed.

SUBJECTS

(*a*) *Description Method*

There were 24 subjects, including 15 men and 9 women. All the men were first or second year University students, mostly from the Science faculty; none were students of psychology. Eleven men wrote descriptions for all the 48 cards, four men completed from one to three sets only. Their average age was 19·9 years, with a S.D. of 2·01. Six of the women were first year Social Science students, three were hospital sisters with experience of psychiatric patients. Their average age was 29·4 years, with a S.D. of 14·36.

(*b*) *Matching Method*

There were 38 subjects, including 33 women and 5 men. Twenty-three subjects were members of a Women's Institute; the remaining two groups of 6 and 9 subjects respectively belonged to two different University Extension classes in psychology. The average age for all subjects was 47·3 years, with a S.D. of 11·39.

RESULTS

In the entire collection of 48 pictures, a total of six pictures can be expected to be correctly identified by chance. The mean numbers of correct identifications in both experiments are considerably above this number. The figure obtained in the Description experiment is 14·3, and in the Matching test, 9·3. These figures exceed chance expectation at the 0·001 level of significance, if the t ratios are calculated from the percentages of total correct identifications to give the normal deviate. The normal deviate for results in the Description test is 20·7; for the Matching test it is 6·8.

But the results displayed in the tables show firstly, that some factors are more easily identified than others (Tables I and II); secondly, that pictures within each category are of grossly unequal stimulus value (Table III).

There is a considerable difference in results obtained, respectively, by the two different methods. Table I shows that the percentage of subject's identifications in the Description test exceeds chance expectation at the 0·001 level for six out of the eight factors; whereas similar percentages in the Matching test, given in Table II, are obtained for only three factors; and one of these, the Depressives, is not significantly identified in the Description test. There was an overlap of identifications in both methods in only 29 out of the 48 pictures.

However, in both experiments, the accurate identification of Homosexuals and Manics exceeds chance expectation, and the Epileptics are at or below the chance level. This is the only true measure of agreement in results obtained on factors as such by the two different methods.

Table III indicates that there is a considerable difference in both sets of results between the stimulus values of individual cards within each factor. Even where there is a high degree of correct identification of pictures within one factor, accurate diagnoses are always weighted on particular cards. For example, in the M factor, four cards are consistently identified with accuracy in both sets of results; whereas the two remaining cards are seldom identified—one of them, VI, 1, is never correctly identified by anybody.

TABLE I

Analyses of Subject's Correct Identifications in the Description Test

Szondi Categories	Total Number of Szondi Pictures in each category	Total Number of Pictures placed in each category	Percentage of Pictures correctly identified	c	P
Homo.	129	124	53·5	14·10	0·001
Sadis.	128	120	32·8	7·00	0·001
Epil.	129	100	17·1	1·59	0·20–0·10
Hyst.	129	127	22·5	3·40	0·001
Cat.	128	107	22·5	3·40	0·001
Par.	128	106	33·3	7·17	0·001
Dep.	129	103	16·2	1·28	0·20
Man.	129	156	51·9	13·60	0·001

TABLE II

Analyses of Subject's Correct Identifications in the Matching Test

Szondi Categories	Total Number of Szondi Pictures in each category	Total Number of Pictures placed in each category	Percentage of Pictures correctly identified	c	P
Homo.	225	234	42·7	13·70	0·001
Sadis.	225	302	12·4	0·04	0·95
Epil.	225	234	9·3	1·50	0·20–0·10
Hyst.	225	222	9·3	1·60	0·10
Cat.	225	196	11·1	0·64	0·50–0·60
Par.	225	217	13·8	0·59	0·50–0·60
Dep.	225	190	18·2	2·59	0·01
Man.	225	175	38·7	11·90	0·001

TABLE III

The Identification of Individual Pictures

	Percentage of Szondi Pictures correctly identified in each category	
Szondi Categories	Description Method	Matching Method
Homosexuals		
I, 5	31·8	13·2
II, 4	54·5	52·6
III, 1	59·1	39·5
IV, 8	85·7	86·5
V, 7	38·1	18·9
VI, 2	52·4	48·6
Sadists		
I, 2	36·4	2·6
II, 7	81·8	5·3
III, 3	9·5	5·3
IV, 6	5·2	5·3
V, 5	5·2	5·3
VI, 4	57·1	51·4
Epileptics		
I, 6	27·3	18·6
II, 3	27·3	2·6
III, 2	18·2	7·9
IV, 7	9·5	23·7
V, 1	19·0	2·7
VI, 8	0·0	0·0
Hysterics		
I, 8	5·6	7·9
II, 1	40·9	2·6
III, 7	18·2	0·0
IV, 2	19·0	13·5
V, 3	33·3	29·7
VI, 6	19·0	2·7
Catatonics		
I, 1	45·5	7·9
II, 8	36·4	26·3
III, 5	28·6	10·5
IV, 4	9·5	13·5
V, 6	14·3	8·1
VI, 3	0·0	0·0
Paranoiacs		
I, 3	22·7	15·8
II, 6	36·4	15·8
III, 8	19·0	0·0
IV, 1	57·1	2·7
V, 4	57·1	21·6
VI, 5	9·5	27·0
Depressives		
I, 4	31·8	39·5
II, 5	22·7	5·3
III, 6	18·2	35·1
IV, 3	9·5	10·8
V, 2	9·5	18·9
VI, 7	5·2	0·0
Manics		
I, 7	54·5	28·9
II, 2	86·4	39·5
III, 4	68·2	63·2
IV, 5	9·5	8·1
V, 8	90·5	91·9
VI, 1	0·0	0·0

Discussion

Considering the total number of correct identifications obtained in both experiments, and the degree to which they exceed the number to be expected by chance, it is clear, at least, that the pictures are not meaningless stimuli for the subjects concerned. But some pictures are obviously more readily identified than others, and the whole question of scatter in the results is one that merits more detailed examination.

Firstly, it is somewhat difficult to account for the divergence in results between the Description and Matching experiments. The results show that those subjects who were allowed to write their own descriptions to the pictures quite freely, gave more correct identifications than the subjects who were confined to the checklist. On the face of it, a checklist should make identification easier; indeed, Rabin (1950a), remarks that it is probably much easier to diagnose with rather than without the aid of a checklist. The above results, however, indicate that the reverse is true for the subjects examined. One obvious reason for this may be that 23 out of the 38 subjects engaged in the Matching experiment were members of a Women's Institute. Some of these women found the novelty of the experimental situation disconcerting, and as a whole this group probably had less psychological insight than the students. Yet there was no appreciable difference in accuracy in matching shown by Institute members and accuracy attained by the 15 Extension class students. Another reason for the disparity between results may be the fact that some subjects reported that they found the checklist too constricting; that is, on occasion some of them wished to combine two or more personality descriptions in the identification of a particular picture, with a relative predominance of one description. Alternatively, they sometimes wanted to reject all descriptions and invent their own in the manner of the Description method. In the extensive experiments of Klopfer and Borstelmann (1950), this first difficulty was overcome by obtaining first and second choices in response to each picture. In this way, the two independent procedures they used arrived at the same designations of the stimulus pictures in 41 out of the 48 pictures—a considerably greater overlap than that reported above.

Another possible advantage held by the Description method is that the technique of uncontrolled association to pictures corresponds closely to Szondi's own method of picture selection. Bearing in mind the Szondi-Deri rationale, a certain liberality therefore was possible in scoring results obtained from the Description method which could not be exercised with the Matching method without making the checklist personality descriptions much too complicated for subjects to absorb readily. Scoring was "liberal" in the sense that the various "sublimations" of mental disorders described by Deri (1949), as surgeons, spies, wrestlers, etc., were scored as correct identifications where they occurred in appropriate categories. The models used in this scoring are contained in chapter III of Deri's book.

Despite this disagreement in the actual significance in the general results obtained from the two experiments, it is firmly established that the Homosexuals and Manics are more easily identified than any of the other factors in both experiments. This confirms the findings of Klopfer and Borstelmann (1950), and of Rabin (1950a and b). Why these two factors in particular are more readily identified than the others is a matter for some speculation. It is possible that superficial facial clues determine responses rather than the genetic determinants suggested by Szondi or the latent tendencies hypothesized by Deri. If this is true, then any smiling face might be classed as Manic, and this would explain why card IV, 5 is so seldom identified, and why card VI, 1 is never identified at all. It is more difficult, however, to single out definite facial characteristics by which the homosexuals might be easily identified. Yet if all the six H pictures are compared one with another, they all appear to look younger and less mature than most of the remaining pictures; the lips especially suggesting youth and immaturity. There is a notable exception with card I, 5, of an older man, with an entirely different cast of features than the other homosexuals, and this picture is much less frequently identified than the remainder in both experiments (see Table III). It is probable that facial clues are of some considerable importance in identification, because experiments conducted by Wallen (1951), on facial tension shown in the Szondi pictures, led him to claim that "groupings based on facial characteristics are more meaningful than those based on the diagnoses of the persons photographed". This might also suggest why the depressives were also identified above chance expectation in the Matching experiment. The drooping mouth might be sufficient to classify at least three out of the six pictures in the D category. The reason why the Depressives were not similarly identified in the Description experiment may be because Deri's character "sublimations" are often far removed from what would be expected from an unhappy facial expression.

This inequality of stimulus value of pictures within the D category is characteristic of all the other Szondi categories (Table III). Inconsistent identifications of pictures within categories are also reported by Dudek and Patterson (1952), using the Matching method. Davis and Raimy (1952), working on 24 cards only, also discovered stimulus inequalities; and the conclusion of Guertin (1951), who used factor analysis on the pictures, is that "there is as much difference in meaning between pictures within the same diagnostic category as there is between pictures from different categories". This finding, as the author points out, is quite at variance with Szondi's assumption that pictures within a diagnostic category have a similar meaning or diagnostic significance. The obvious conclusion to be drawn from these results is that a complete reorganization of the test is needed, where each picture has a known stimulus value of precise statistical significance, standardized for a particular population.

In this event, it is recommended that the Epileptic factor should be excluded from the test altogether. There is now a considerable weight of experimental evidence to support this, not only in the above findings (Tables I and II), but in the results Rabin obtained from students (1950a), and those obtained from a larger population by Klopfer and Borstelmann. All these results show that the E factor is the one least often identified with accuracy. Epilepsy, in particular, raises the further question of the etiologies of the disorders represented by the different Szondi factors. In view of the extreme variety of the causes of epilepsy, it is, even a priori, highly unlikely that there is a personality stereotype for "epilepsy" as such; and this view is supported by the experience of clinicians and the findings of projection tests such as the Rorschach. Even with homosexuals, who are much more successfully identified, it is common knowledge that various environmental and sociological factors may be responsible for the homosexual behaviour which designates a person as "homosexual"—to say nothing of the question of endocrine imbalance. The resulting personality type will depend on the relative predominance of these factors. Yet Szondi has nothing to say on this question of etiology.

At this stage it might be argued that in spite of the dubious nature of the theoretical rationale of the Szondi test, it is nevertheless a clinical tool which can be used in research merely because it seems to "work" in clinical practice. But a preliminary review of the literature strongly suggests that even the clinical value of the test is by no means established.

Szondi literature at present reveals seven studies which support the test in its clinical aspects. These are by Calabresi (1948), David (1949), Holt (1950), Kaldegg (1951), Stumper (1951), Kobler (1952), and by Mignot and Gabel (1952). Eight studies, on the other hand, did not reveal the test to be reliable from many clinical points of view. These studies are by Ancelin *et al.* (1949), Giuliani (1949), Chiodi *et al.* (1950), Fosberg (1950), Paine (1950), Wiegersma (1950), Cole (1951), and by Mussen and Krauss (1952).

This review is somewhat more favourable to the test than the one presented by Guertin and McMahan (1951), who found only two investigations which seemed to support the test clinically. Yet six of the above seven pro-Szondi studies were conducted on four or less than four subjects; the remaining study was only a short preliminary report (by David, 1949). Here, results based on Szondi's method of structural analysis agreed with staff diagnosis in 88 per cent. cases of 50 paranoid schizophrenics. Yet as Guertin and McMahan point out, "the report is so brief that the reader is left in doubt as to what constitutes agreement". On the other hand, studies raising critical doubts about the value of the test were all conducted much more extensively on larger populations, never on less than twenty subjects.

On balance, therefore, it is very doubtful whether the Szondi test as it stands at present is of sound clinical value. This makes a demonstrable theoretical rationale doubly necessary if the test continues to be used in clinical practice. The methods described of obtaining verbal reactions to the pictures and assessing their statistical significance in relation to the Szondi factors is a fruitful approach to the problem of validation. Enough has been demonstrated in the Tables and elsewhere to show that it is doubtful whether many of the individual pictures, and at least one factor—the Epileptic—should be retained. Future use of the Szondi test should be guided by the relative degrees of reliability of the various categories and cards discovered in this investigation and the other researches mentioned. In view of the considerable amount of agreement reached by different workers, a revised scale could be quite easily worked out on the basis of their findings. This would be of greater value to clinical psychologists than the test as it stands at present, with its inherent inconsistencies in stimulus values.

SUMMARY

An attempt was made to investigate the theoretical basis of the Szondi test by obtaining, experimentally, identifications of the Szondi pictures. The Description and Matching methods used correspond to those adopted by American investigators, but were employed for the first time on groups of English subjects.

The results show that although, in general, the pictures are not meaningless stimuli, certain factors and particular pictures are more readily identified than others. Homosexuals and Manics are the most frequently identified factors in both tests, the Epileptics being least frequently diagnosed with accuracy. These findings largely confirm the results published by American investigators, although significant differences were found in results obtained respectively from the two different methods.

It is suggested further that facial clues may be important in the determination of responses.

The inequality of stimulus value of particular cards indicates that a complete reorganization of the test is needed. This might now be achieved by a synthesis of the results of several experimental studies available on Szondi theory.

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THE INDICATIONS FOR PSYCHO-ANALYSIS*

By

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If the standards of psychotherapy approximated to those in vogue in the field of organic medicine a lecture on the indications for psycho-analysis would be a comparatively brief and possibly tedious affair. Since, however, there is no uniform diagnosis of mental disorders, no exact account of the rationale of psycho-analytic treatment and no assented list of the modifications of treatment required in different forms of disorder, it is obvious that before we can usefully discuss indications for psycho-analysis or in other words the scope of psycho-analytic treatment we must arrive at a certain amount of agreement regarding the diagnosis and prognosis of mental disorders and the nature of psycho-analytic therapy.

Before attempting to do so we must recognize a subjective source of bias, which although not unknown in general psycho-therapy is particularly obstructive of progress in the case of psycho-analysis. Owing to the early and widespread opposition with which they were faced, psycho-analysts developed and still maintain a number of protective reactions. Being put on the defensive they naturally buttressed their own position, maintaining, for example, that psycho-analysis was the most radical form of treatment for disorders of varying gravity, and sometimes, if only by implication, casting doubt on the depth and permanence of the results obtained by non-analytical treatment in such cases. To which it may be added that within their own walls, they gave short shrift to any followers who might be tempted to dally with short-term methods of treatment.

This was an unfortunate policy; for like most psycho-therapeutists, the psycho-analyst is a reluctant and inexpert statistician. No accurate records or after-histories of psycho-analytical treatment exist: such rough figures as can be obtained do not suggest that psycho-analysis is notably more successful than other forms of therapy: and in any case none of the figures is corrected for spontaneous remission or resolution of symptoms. In consequence of all this psycho-analysis has developed a so-far unacknowledged mystique which borders on the esoteric, and, like most esoteric products, springs from inferiority feeling. The attitude is in any case as ill-founded as it is aggravating to non-analysts. The validity of psycho-analytic theory never did depend on therapeutic results nor, for the matter of that, does the validity of any other theory of mental function. The fact that a very large proportion of schizophrenics are inaccessible to the ordinary expectant techniques of psycho-analysis does not invalidate psycho-analytical etiologies of schizophrenia. Research and therapy, though frequently combined in psycho-analysis, are clearly different things.

To begin therefore with definitions of psycho-analysis and of psycho-analytic treatment: it used to be said, up to twenty-five years ago, that whoever believed in the existence of the unconscious, in infantile sexuality, in repression, in unconscious conflict and in transference believed in psycho-analysis. Such was the definition of the late T. W. Mitchell, an acute and sympathetic student; and, despite the passage of time, despite increases in the theory of ego-development, despite increasing emphasis on the factor of unconscious aggression and a corresponding burgeoning of psycho-analytical terminology, it is still a satisfactory definition, on which criteria of psycho-analytical therapy can also be based. In short we may say that whoever holds these fundamental concepts, understands the processes of mental development by which they are arrived at, has taken steps by personal analysis to eliminate, as far as that is possible, the errors of subjective bias, has learned to apply the technique of association and interpretation and is capable of analysing as far as possible the transferences and counter-transferences that arise in an analytic situation, can call his treatment psycho-analytic therapy.

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Of those conditions, the capacity and determination to analyse the transference is decisive when drawing a distinction between psycho-analysis and other forms of psycho-therapy. It was Ernest Jones, I think, who was in the habit of saying that there are only two forms of psycho-therapy, namely, psycho-analysis and suggestion. Although this must appear an unduly sharp saying to psycho-therapeutists who spend a good deal of devoted energy and ingenuity on analysing the material or symptom-formations presented by their patients, it is certainly true in the sense that an analysis which does not analyse the transference is no different from any other form of psycho-therapy: it depends ultimately on the state of therapeutic rapport existing between the psycho-therapeutist and the patient.

General psycho-therapeutists may however take comfort from the reflection that however sharp the saying, it is also two-edged. For should the analyst not succeed in analysing the transference, or should his modifications of technique, e.g. in the direction of active measures or of moral support, prevent his successfully analysing the transference, then his treatment depends for its success or failure as much on factors of rapport as on his analytical activities.

A further case exists: should the analyst's interpretations be consistently inaccurate then quite clearly he is practising a form of suggestion, whatever else he himself may call it. It follows then that when analysts differ radically as to the etiology or structure of a case—as they nowadays do with increasing frequency—one side or the other must be practising suggestion. Since analyses, in private practice at any rate, tend to be lengthy, seldom less than two years and frequently of four years' duration it can easily be imagined how powerful the force of such analytical suggestion must be.

Regarding the question of modification of analytical technique it is obvious that the necessity for such modification depends on how widely the analyst casts his therapeutic net. For it is clear that if one attempts the analysis of, e.g. drug addicts, psychopaths and psychotic cases, the situations existing during crises do not usually permit continuance of the expectant technique used in the psycho-neuroses and equivalent states. It can however be fairly claimed that, provided the usual techniques of association, interpretation and transference-analysis are followed whenever possible, such modifications as are entailed by the clinical necessities of the case or by the need to safeguard such of the patient's interests as he is for the time himself incapable of safeguarding, can justifiably be called psycho-analysis.

Having arrived at a working definition of psycho-analytic therapy, we may proceed to consider the difficulties arising from variation in classifications of mental disorders and in methods of diagnosis and prognosis. Here I think psycho-analysis may justly be said to have added considerably to our understanding both in diagnostic and in prognostic respects. Although ready to accept most of the clinical distinctions advanced by psychiatry, psycho-analysis has chosen to adopt a *developmental approach* to these clinical data. In the first place it regards all adult disorders, most adolescent disorders and a few prepubertal disorders (notably the obsessional neuroses) as end products, the predisposition to which is established during the first five to six years of life. The nodal points in maldevelopment, mostly unconscious to be sure, are termed fixation-points, which vary in number, depth and scatter. Following the theory of fixation-points, psycho-analysis has arranged adult mental disorders in accordance with the developmental level to which the mind regresses when faced with precipitating factors of frustration or traumatic excitation or both. Thus to take a few instances, anxiety hysteria is regarded as having an etiology based on disturbances at the fourth and fifth years of mental development when genital anxieties constitute the main pathogenic factors and repression is the main defence, the obsessional states as having fixation-points about the three to four year level when pregenital factors are decisive and defence is mainly reactive in type, and most psychoses as products of maldevelopment occurring during the first three years of life when both libido and ego development are exceedingly primitive. Classifications on this basis have not yet been worked out for various intermediate or transitional conditions but there is every prospect that a fairly accurate hierarchy of pathological elements based on developmental criteria will some day be established. Alcoholism and some types of psychopathy for example illustrate transitional forms lying between the neuroses and the psychoses.

The validity of this developmental approach is borne out by two circumstances of considerable therapeutic significance. The first of these concerns the degree of ego disorder and the second the degree of "transference potential" or "accessibility" as it is often called. It is in accordance with theoretical considerations that the more profound mental disorders, having early and scattered fixation-points, should show greater instability and lack of synthesis of the ego than, for example, the neuroses. For therapeutic purposes, this factor can best be described in two ways, first, by the degree of capacity of the ego to withstand stress and trauma, and, second, the degree of capacity to make accurate reality estimations. It is obvious, for example, that if the faculty of reality-proving is gravely disordered, there is little prospect that the ordinary techniques of expectant analysis will be effective, if indeed they are even applicable.

Similarly with the transference factor. The earlier the fixation-points the more tenuous the positive transference bond and the less accessible the patient is to that opening-up process of analysis which depends on a working transference. In this connection it is useful to recall that Freud originally designated the hysterias and obsessional states as "transference neuroses" and that psycho-analysis achieved and still achieves its greatest number of successes in this particular field. In illustration of the value of the developmental approach and of the practical (therapeutic) significance of ego-synthesis and of "transference potential", we may consider the fact that whereas the hysterias are readily accessible to analysis, cases of "pure" obsessional neurosis (i.e. unmixed with hysteria) are extremely difficult to resolve and commonly require a lengthy analysis, up to four years in many cases. This can be understood partly in terms of the earlier fixation points of the obsessional states, and partly the ambivalue of the transference. It is much better understood if we reflect that the obsessional states, behind which we can sometimes detect in the unconscious depressive or even paranoid layers, seem on the whole to protect against psychotic regressions. Although they may persist and expand up to the forties, they rarely regress to a psychotic state. Their refractoriness to analysis is thus seen to be a function of their defence of the ego against further regression.

Although psycho-analysts like most other psycho-therapeutists concentrate a good deal of their energy on the classical psychiatric disorders, they have also turned their attention to two other large psychopathological groups, viz. the so-called character disorders and the psycho-sexual disorders. Both types of disturbance are commonly found in association or conjunction, as in marital difficulties; and it is tempting to suppose that both groups are also capable of sub-division according to developmental (predisposing) levels. Although plausible in theory, this correlation between developmental layer and pathological end-products is much more difficult in character cases and sexual disorders than it is in the case of psychiatric "symptom-formations", where the clinical symptoms afford relatively easy means of identification. This is easy to understand. A symptom-formation carries on it the hallmark of its origin: a character disorder does not have the same developmental hallmarks, a psycho-sexual disorder still less.

Fortunately for diagnosticians there are many exceptions to this rule. An obsessional character for example is so close in pattern to an obsessional neurosis that it is not hard to find common developmental origins, and where homosexual or anal-sadistic sexual perversions are accompanied by obsessional characteristics it is not difficult to suppose that they too spring from roughly the same level. On the other hand the condition of impotence may occur as frequently in the psychoses as it does in persons of an anxiety type and diagnosis of its clinical importance can be effected only on the strength of accompanying characteristics or symptom-formations.

Despite these difficulties there are considerable diagnostic, prognostic and therapeutic advantages to be gained by ordering symptom-formations, character disorders and psycho-sexual difficulties in roughly parallel series and by establishing rough *states of equivalence* between the three groups. Perhaps the best illustration is afforded by those transitional states that lie between the psychoses and the psycho-neuroses. Analytical examination of alcoholism for example, shows that these states can be divided roughly into four groups; those that show a predominantly projective character, veering towards persecutory feeling and reaction; those in which there is a depressive basis to the addiction; those in which obsessive (compulsive) tendencies predominate; and those in which the periodic bouts of alcoholism coincide with excessive anxiety and/or inferiority manifestations. Running parallel to the persecutory type of alcoholism are certain forms of active homosexuality associated with strong contamination fears; the psycho-sexual manifestations etiologically equivalent to the depressive types of alcoholism fall mainly in the inhibited group, and express themselves commonly in impotent forms of homosexuality: obsessional types of alcoholism find their psycho-sexual parallel in fetichism; and anxiety types of alcoholism correspond with the familiar forms of psycho-sexual impotence which have however a strong latent homosexual disposition.

Correlating the same three groups with character difficulties, we find the persecutory type of alcoholism corresponding with severe difficulties in social adaptation, querulence, suspicion, aggressiveness and incapacity in social relationships, the depressive type corresponding with chronic incapacity and lack of success in work, the obsessive type with obsessive indecision in life and work, and the anxiety type with marked social inferiority.

As has been admitted, these correlations have not been very fully worked out, but already they enable us to arrive at useful prognostic assessments. The obvious difference in therapeutic response between the persecutory and the anxiety type of alcoholism can also be detected in the equivalent character and psycho-sexual disorders. It is important to be clear about this, otherwise the whole problem of indications for analysis is liable to be confused. Unless we make such etiological distinctions, it is in fact impossible to give a straight answer to the simplest questions, such as, "Is psycho-analysis indicated in alcoholism?" Similarly with the equally simple question "Is psycho-analysis indicated in impotence?"; the answer is of course "It depends on the underlying states of disordered defence". Again, although psycho-analysis obtains some of its best results in the treatment of anxiety hysteria, he would be a reckless prognostician who would recommend it in the case of monosymptomatic phobias without first of all examining the character structure to see whether this belongs also to the uncomplicated hysterical group or whether there is evidence of larval psychotic reaction, as there often is.

So much for the symptomatic aspects of the problem, but symptomatic criteria alone do not resolve the many difficulties attendant on making a prognosis. Nor for the matter of that is it possible to give an exact prognosis by estimating, however shrewdly, the transference potential. A patient may appear and in fact be quite accessible to a psycho-analytic approach, yet the analysis may miscarry or end in stalemate simply because in the process of diagnosis, too little attention has been paid to the total function of his mind and in particular to the factors of primary and secondary gain.

Now the primary gain, that is to say, the part played by the symptom-formation in maintaining however inefficiently and at whatever cost to the individual the dynamic balance of the mental apparatus, or in simpler terms in avoiding a break through of unconscious conflict, is not easy to estimate during preliminary examination. One may in all cases suspect that it is powerful enough, particularly where the form of the symptom-formation suggests either a reinforced masochistic predisposition or a defence against acute sadistic conflict or again violent psycho-sexual anxiety. The primary gain in some depressions, in most obsessional neuroses and in many forms of hysteria or marital disorder is extremely hard to deal with, but it is rarely possible to estimate it with accuracy until after a probationary period of analysis.

Secondary gain is quite a different matter. There should be no great difficulty in estimating already at consultation whether by virtue of his neurosis or other disorder the patient succeeds in securing a favoured situation in his family environment, or is able to conceal his deficiencies from himself, or whether his conditions of life are such as to maintain a high level of frustration which keeps a symptomatic regression alive. When, for example, an anxiety hysteric within, say, ten years of the climacteric is caught in a loveless marriage from which, owing to her obligations as a parent, she is unable to free herself, it is foolish to suppose that psycho-analysis or for the matter of that any form of psycho-therapy will liquidate even the simplest forms of phobia. When a latent male homosexual finds himself in the middle forties still unmarried and without adequate male friendships it is equally foolish to suppose that his working inhibitions will respond to however dextrous an analysis. Nor should we expect the multitudinous fifty-year-old anxiety depressions automatically to respond to a therapy which depends ultimately on an analysis of the transference and on the capacity of the patient to face squarely the emotional deficiencies of his life. Fortunately it is not hard to estimate the nature and strength of secondary gain, for, as a rule it is equal and opposite to the precipitating factor.

Summing up the prognostic situation, we may say that roughly there are three factors to be taken into account; first, the depth of symptom-formations in which constitutional, predisposing (developmental) and precipitating (immediate) elements have to be assessed; second, the degree of transference potential, which must have a sufficiently strong positive side to withstand the stress incident to the uncovering of unconscious conflict (here the primary gain factor operates); and, third, the strength and persistence of the precipitating factors which determine in turn the strength of secondary gain. Where no major symptom formations are present and the disorder lies in malfunction of the ego and super-ego, i.e. in the character structure, prognosis is not so easily arrived at but can be estimated roughly in accordance with the total characteristics of the ego and the degree of primary and secondary gain; where the disorder takes the form of inhibition or perversion of function, particularly in work and love, the prognosis is again variable but can be roughly estimated by an examination of ego-characteristics and by such minor symptom-formations as may accompany the inhibitions and give some clue to their depth.

Although in principle the groups of factors we have considered cover the prognostic field, there are some items of sufficient importance to call for special mention. The factor of age for example is of more importance in psycho-analysis than in any other form of psycho-therapy. As has been pointed out earlier the hallmark of analysis is in the last resort the analysis of the transference, but analysis of the transference is not only a test for the analyst, it is a pretty searching test of the patient's capacity to free himself from fixations as well as from symptoms. With increasing age this feat is more difficult to compass. Non-analytical therapies in which transference support or exploitation is the rule have no such difficulties to face and consequently can be applied more readily to cases of advanced age. Despite these difficulties psycho-analysis which was originally confined mostly to the under-forties is now freely applied up to the sixties. Owing however to the factors of regression and of secondary gain it is doubtful whether many analyses of persons over the age period of 45 to 50 are ever completed in the strict sense of the term. After this age the strength of the precipitating factors is in most cases the decisive prognostic test.

It is equally doubtful, although for different reasons, whether analysis of young children is ever completed, and incidentally the therapeutic standards are also different from those applicable in the case of adults. In the first place the persistence of symptoms in a modified form need not be regarded as a failure provided there is evidence of strengthened character formation. Secondly the success of a child analysis cannot be satisfactorily checked until an after-history of 15 years has been secured. Indeed in estimating the therapeutic efficacy of psycho-analysis it would be well to exclude all children under the age of puberty and adults over the age of 45-50. In the case of adults whose age lies between these lower and upper limits, an after-history of at least 5 years is essential. Unfortunately it has to be admitted that satisfactory after-histories are seldom forthcoming; consequently our knowledge of the therapeutic range of psycho-analysis is vitiated by unchecked surmise which too often errs on the side of complacency.

We are now I hope in a better position to deal with the main topic of this paper, viz. the indications for psycho-analysis. It will, I hope, also be clear that there can be no question of sub-dividing these indications rigidly in accordance with the clinical group. Nor strictly speaking is there any need to do so. From the therapeutic point of view it is sufficient to subdivide cases into those in which cure can reasonably be expected, cases in which considerable improvement may be anticipated, cases in which only slight improvement is likely to occur and cases which are not likely to improve except possibly in minor respects. Any notion that psycho-analysis is a panacea or that it should be recommended to every case coming for consultation is obviously absurd and the analyst who proceeds on this preposterous assumption is destined to early disillusionment. From the point of view of analytic therapy therefore, we can divide cases into three main groups, viz. accessible, moderately accessible and only slightly accessible.

The first of these groups is comparatively easy to delimit. It is constituted by the anxiety hysterias, the conversion hysterias, cases of mixed neurosis in which obsessional and hysterical elements are associated, and some cases of anxiety depression of a mainly reactive type. Care should of course be taken not to include in this category mixed neurosis where there is an underlying system of endogenous depression. To these may be added disorders of sexual, social, marital and occupational life which I have described as "equivalents" of a neurotic symptom formation. They include simple impotence, ejaculatio praecox and vaginal frigidity, early marital frictions, facultative bisexuality, anxiety of an inferiority type and phobiac types of working inhibition (e.g. examination anxiety), neurotic confusional states and lack of powers of concentration leading to incapacity to work. The feature of such equivalent cases is that the predominant anxiety arises from the later infantile genital phases of development.

At the head of the moderately accessible group I would put the average organized obsessional neurosis and obsessional character cases. As I have pointed out these are by no means readily accessible to analysis, but on the other hand I cannot think of any other method of treatment which has better prospect of penetrating the structure of these conditions. In this group come also a number of sexual perversions having their roots mainly in pregenital layers of development. Typical examples are fetichism, transvestism, and cases of active homosexuality in persons under the age of 40: the younger the better in fact. Alcoholism and drug addiction having a psycho-neurotic or mildly depressive basis also come in this category. As a rule treatment requires to be combined with a course of abstinence conducted by another physician. However difficult it may be to obtain cure by analysis, it occurs to me that to deal with alcoholism and drug addiction solely by abstinence methods and without any analysis is to leave the patient at the mercy of a psycho-pathological process which he was originally unable to withstand.

The second group also includes cases of phobia formation, conversion hysteria and the equivalents in sexual and social disorder which owing to the operation of an earlier type of pregenital fixation are more resistant to analysis, and to these I would add a number of milder cases of psychopathy under the age of 25.

I am in some doubt whether to include in the second group some cases of endogenous depression. There are certain types of both larval and manifest endogenous depression in which the traumatic fixations at late pregenital and genital levels of childhood have apparently been of greater significance than the more usual oral fixations, and in which in consequence the sado-masochistic predisposition does not offer so much resistance to analysis. Certainly a number of these cases although long drawn out respond satisfactorily, but to err on the side of caution I usually include the endogenous depressions in the third or intractable group.

As in the case of the second group, the third or intractable group includes cases which would ordinarily come in the earlier groups but for evidence of deeper or wider ego disorder. The best example is afforded by types of alcoholism which cover either an endogenous depression or a paranoid predisposition. The third group also includes cases of anxiety hysteria which appear to have a psychotic sub-structure. Many severe monosymptomatic phobias are of this type, but the main constituents of the group fall under four subheadings, the pure psychoses, the psychotic characters, severe cases of psychopathy, and sexual perversions and inhibitions of an equivalent order, including incidentally some apparently simple cases of impotence and frigidity and a large number of marital disorders. Needless to say amongst the psychoses the endogenous depressions are the most favourable and the pure paranoias the most unfavourable.

It will be observed that no mention has been made in any of these divisions of the expanding group of "psycho-somatic" cases. My reason for omitting these is really to raise a special problem, viz. of cases suitable for psycho-analytically directed therapy as distinct from pure psycho-analysis, which as you know is a lengthy and more or less standardized procedure, involving under the present usages of private practice, a period which, unless curtailed by extrinsic circumstances, runs in the average from 18 months to 2 years, with an average of 5 weekly sessions and involving fees that are likely to tax the resources of all except the well-to-do. The decision to recommend straight analysis in psycho-somatic cases depends on whether the patient also presents neurotic or psychotic symptom-formations or again sexual or social inhibitions or perversions of the kind already tabulated. In such cases psycho-analysis is indicated, but with the same sub-divisions of prognostic groups, mild, moderately accessible and intractable. It should be remembered that psycho-somatic conditions contribute to what are sometimes called patho-neuroses or organ-fixation-neuroses, also that a pure psycho-neurosis can be readily built round a psycho-somatic core. When however no such complications exist the case can well be dealt with by short-term exploratory and abreactive methods, which however I have no hesitation in maintaining should be based on psycho-analytical principles and orientation. For I do not conceal my view that alone amidst the welter of present-day psycho-therapeutic systems, psycho-analysis offers a reasonable theory and etiology not only of mental disorders but of those disturbances of mental *function* (as distinct from "symptom-formations") which follow from states of mental over-excitation of whatever cause.

Having roughly divided the cases that appear most commonly in the psychiatric consulting room into three prognostic groups, it is possible to give an equally rough indication of recommendations. The first group comprises those cases in which psycho-analysis, in my view, ought to be recommended forthwith and with a reasonable expectation of cure. The second group comprises cases in which substantial improvement may be expected but where there is no certainty of cure. In the third group certainty of cure or even of major improvement cannot be expected and should never be promised. It is true that well-selected cases taken from this third group may from time to time give surprisingly good results, but it would be absurd to pretend that on the average more than a mild degree of betterment can be expected.

Nevertheless, as I have suggested in the case of alcoholism, the indications for psycho-analysis should not be determined exclusively by prognosis. No organic physician would refuse to treat a case of rheumatism because it was chronic, intractable and promised at best only a mild degree of improvement. So long as there is reasonable chance of an improvement which could not be obtained more rapidly by some other form of psycho-therapy, it is perfectly justifiable to recommend psycho-analysis in difficult cases. Particularly in the psychoses, psychotic characters and severe sexual disorders therapeutic failure is an honourable failure which may in course of time lead to an improvement of the therapeutic instrument. Other things being equal, what should determine the recommendation is an objective assessment of the will to recovery as opposed to the primary and secondary gains secured through illness. A favourable balance justifies the recommendation.

A short postscript on lay-analysis. A properly qualified lay-analyst can safely be entrusted with any of the cases listed above with the exception of certain well-defined groups (*a*) cases of somatic disturbance of whatever kind that call for clinical (medical) discrimination, (*b*) cases in which crises may arise involving danger to life. This latter condition automatically excludes the psychoses and psychotic characters. In any case these should be excluded since lay-analysts undergo no adequate training in psychiatry. To be on the safe side it might be desirable also to exclude such cases as call for concurrent sedation and for a decision as to periods of institutional supervision. But of course this difficulty can be overcome provided there exists an adequate liaison between the lay-analyst and the psychiatrist recommending the case. In many instances it is essential for the medically trained psycho-analyst to maintain similar communications. In cases of alcoholism involving complete abstinence the necessity for this is obvious, for the analyst cannot well conduct the abstinence; but also in cases involving supervision it is essential for the analyst to have ready means of support in the event of crises developing which require hospital supervision. The psycho-analyst who throws his therapeutic net widely is faced with frequent uncertainties, anxieties and harassments and it is of considerable moral and professional support to him on occasions of difficulty to know that he has behind him the expert knowledge and co-operation of an understanding psychiatrist.

SCIENTIFIC PSYCHOPATHOLOGY AND RELIGIOUS ISSUES*

By

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DURING the last few years it has become more and more apparent that there exists a considerable impatience and even intolerance between traditional religious thought, and certain assertions on the part of social sciences and psychology, which have become influenced by psychoanalysis. Psychoanalysis, as is generally known, was born out of psychopathology and both sociology and psychopathology joined hands recently to make friends with one another and with anthropology. The result of all this is the almost emphatic claim that psychopathology and social sciences have become scientific disciplines—or that they have become more influenced by the scientific method than by philosophy. To a certain extent this claim is justified; yet and almost in spite of this there is a far cry between the modern meaning of the term anthropology and the meaning which *anthropologia* had originally. Instead of being the *science of man*, it has become more the science of human institutions and social relationships; it has fallen under the heavy weight of statistical averages, which are still mistakenly accepted as the best entering wedge into the field of true (scientific!) knowledge.

The "conversion" (if I may use this term here, rather conditionally), the conversion of social sciences and psychology to the scientific method has done an immeasurable amount of good. Who would deny today the revolutionary and far-reaching contributions made by psychopathology during the last fifty years? Who would be willing to question the breadth and depth of our enhanced knowledge of man for which psychoanalysis and cultural anthropology are to be gratefully acknowledged as most potent factors? At the same time, almost simultaneously another system of thought—also claiming to have drunk from the fountain of true scientific knowledge—arose to assert itself as the official and rather powerful agent of social transformation. I have in mind economic determinism, or historical materialism, or Marxism for short. It is essential to observe that Marxism and psychoanalysis do not mix well. The Marxist considers psychoanalysis as a form of metaphysics. And what could sound more opprobrious to a scientist than the appellation of metaphysician? Psychoanalysis officially placing itself on the pedestal of biology, considers Marxism one-sided and not at all reflecting the real nature of man. On the other hand, religious thought, we often hear, is opposed to both Marxism and psychoanalysis as different forms of materialism, and religion rejects or fights against both with considerable fervour.

In other words, we witness the manifestation of a true battle, of a violent conflict between religion and those trends or systems of sociology and psychology which claim the distinction of being scientific. There is little doubt, it would seem, that there is real and deep conflict between science and religion. However, despite the very loudness and intensity of the voices, I would make bold and state from the very outset that this conflict is only a conflict between men who use either religion or science as a weapon of attack or defence. For on closer inspection of the battlefield, which through centuries was literally soaked in the blood of victims, we would find it at times very difficult to discern the martyr from the allegedly godless victim. And we would further find that the struggle was only officially that of religion and science, that actually it was a contest between two or three or a host of groups of men, who for the most part knew not exactly what they were fighting, killing, and dying for unless it was for power. We would find that a number of truly scientific minds remained deeply religious without abandoning science, and truly scientific without abandoning their religion.

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Freud's official attitude toward religion is well known. His book *The Future of an Illusion* ends with a positive denial that there can be any knowledge outside science. Says Freud: ". . . Science is no illusion. But it would be an illusion to suppose that we could get anywhere else what it cannot give us." Yet the same Freud asserts: "One would like to count one's self among the believers so as to admonish the philosophers who try to preserve the God of religion by substituting for him an impersonal, shadowy, abstract principle and say: 'Thou shalt not take the name of the Lord, thy God, in vain'." It is almost self-evident that Freud was far from having solved the problem for himself and still less for others, of course. There is no reason to expect a solution of this problem from Freud; he was imbued with the faith that only scientific knowledge is true knowledge, and yet in his scientific work he relied upon myths, sagas, folklore, dreams, fantasies, the greatest and the humblest flights of human imagination. In other words, Freud stood in his own way so to speak, since he elevated to the majesty of final causes the psychological mechanisms which he was privileged to discover. In this respect Freud was a typical example of the scientist who confuses the mechanics of natural phenomena with the causation and purpose of natural phenomena. Someone aptly called this attitude the elevation of science to the level of unshakable dogma; it is scientism, not scientific. Yet even Freud who gave himself fully to scientism, in numerous passages of his writings reveals direct and indirect evidence that he was not entirely unaware of his own inner struggle between dogmatic scientism and that something which is beyond conventional science. It is important in this respect not to forget that it was Freud who elevated the most unscientific of all the tools —human intuition—to the dignity of a keen instrument of investigation of human psychology.

By contrast, Einstein seems not only to have no difficulty with the problem, but he is definitive on the subject. To Einstein the very fact that science is possible is the most incomprehensible and revelatory thing. To him the very existence of science is a creative act which lies beyond science, and therefore Einstein finds himself in no conflict with religion. More than that, he feels moved to assert that he could not imagine science without religion—and *vice versa.* As C. A. Coulson, who is a Professor of Theoretical Physics at King's College at the University of London, puts it: ". . . science is like a rudderless ship whose very excellence becomes her undoing. For power without purpose, knowledge without responsibility, science without conscience, these never have been and never will be a fulfilment for mankind", and conversely, Coulson continues, "Either Christianity can fit in with what I called the pattern of science, understanding it and being understood by it: or else in opposition, it will be driven relentlessly out of every hedgehog position in which it would seek to entrench itself. If we cannot see the march of science as one aspect of the revelation of God then it will not be long before the 'illusion' referred to by Freud, is recognized for what it is: and on that day God will be dead." (1)

The above quotation is intended to be brought forth not as an authoritative statement of a religious position, but rather as an illustration of an extremely interesting position of a scientific man, a physicist who, far from admitting that science and religion must by their very nature be in a state of conflict, asserts the interdependence of both, sees in science and religion a synthesis of one universe, of one function of man in relation to the immensity of his world.

Bearing this rather telling illustration in mind, it would not be without interest to recall that Newton was deeply religious, but that he would use God rather naively even though with devotion and piety. Newton explained the movement of planets around the sun by the laws of gravitation; certain irregularities in the observed motions of the planets he could not explain in terms of his law of gravitation. "Moreover, if these irregularities were cumulative, they would in the course of time pile up such great deviations that they would upset the whole balance of the solar system. The planets would either dive into the sun or break loose from its control and rush off into outer space. Why is it that this does not happen? Newton could think of only one explanation. It must be that from time to time God intervenes and puts the errant planets back on their proper paths. This is noteworthy as being, as far as I know, the last historical occasion on which a great scientist was willing to give supernatural intervention as a cause of an observed phenomenon. The German philosopher Leibniz observed that Newton's God was a mechanic, and a poor one at that, since he could only make a machine which could be kept going right by frequent subsequent tinkering." (2)

No wonder then that when Laplace thought that he arrived at a satisfactory scientific explanation of the phenomenon which had puzzled Newton, he stated that God as a hypothesis had proved unnecessary.

W. T. Stace is inclined to believe that the true conflict between science and religion was established and deepened by the scientific revolution of the seventeenth century. He thinks that naturalism sought to establish itself as a dogma and consequently aligned itself against religion with all the power of conviction which the formulation of natural laws offers. This is quite true, but only to the extent that the scientist would insist that there is no truth outside science. ". . . no scientific argument—by which I mean an argument drawn from the phenomena of nature—can ever have the slightest tendency either to prove or to disprove the existence of God, in short that science is irrelevant to religion."(3) This point of view is not new but it is not complete; it fails to give us a synthesis of that which religion and science have to offer each in its respective way. This point of view, taken without further ado, might even suggest that we return to the Cartesian dichotomy in which the "natural" man would be considered an autonomous machine and the spiritual one a being apart. This dichotomy proved untenable to many, even in the days of Descartes, and it does appear even more untenable to those who—whether religious or naturalists—take the human individual as an indivisible whole which cannot be cleaved into parts by subtleties of formal logical arguments.

Contemporary psychology does not visualize the individual as an arithmetical sum of various parts, but rather as a unified synthesis of all the ingredients which seem to make up man. In accordance with modern psychology, man is not made up of an animal part and a human part; man is both human and animal, rational and irrational, material and spiritual, he is one and all of those things at one and the same time. He is always confronted by the great problem which is most simply denoted as the problem of making a choice —a choice of being at any given practical moment, an animal or a human being, a material or spiritual agent, a logical or paralogical mind. All this presents more and more complicated problems which cannot be solved either by being purely scientific or purely religious. As Stace, whom I have already quoted above, puts it: "The key to the solution of this problem lies in the consideration that men's minds do not usually work in the way that logicians say they should."(4) This is really the crux of the problem, and we ought to dwell on this in greater detail, if possible. The suggestion that human minds do not necessarily or always, or perhaps ever, function in accordance with the precepts laid down by the logicians is a very potent one. The contemporary psychopathologist will not find it difficult to agree with the above statement, since he knows that affective factors more unconscious than conscious dominate our thinking more than it appears and more than we are willing to admit.

The problem then appears to be a psychological one; it is a problem of uncovering the manner of our confusion on the question of science and religion rather than the alleged enlightenment which each of these could offer without disregarding the other. I do not think that the present-day confusion can be easily cleared up yet. So many emotions, passions, insecurities and intolerances activate our contentions on the subject that all one can do for the time being is to proceed with caution and diffidence and humble hope.

Embarking cautiously on this path of search let me remind you first of all of the words of Liston Pope, who so aptly and concisely summarized the condition of the contemporary mind: "Scientism, not to be confused with science itself, is the faith that science is the only way to truth or knowledge and that science provides the only hope for man's salvation. Scientism is the dogma of science. Science the Searcher is transformed by Scientism into Science the Saviour." (5) And further: "Science the Servant will become Science the Master of mankind; having learned to control the physical world, it will learn to control human relations as well and to release the mind and spirit of man from all bondage except to science itself." (6) And further still: "When science is made into a religion, becoming an object of worship and a system of ultimate truth, it invariably becomes a bad religion, teaching man to worship the achievement of the human mind. By the same token, it becomes bad science and tends to harden into a dogma." (7)

Here we have again a telling allusion to the fact that science, when it is permitted to develop into scientism, leads to the worship of the human mind. This is another way of saying that the centre of attention and interest becomes not truth, universal or particular, not knowledge of man or God, but rather a self-contained preoccupation with the adoration of the human mind—a psychological condition of utmost importance from the standpoint of modern psychology. In its most direct form it is narcissism, and in its consequences it does not even lead to self-knowledge. Still less would it lead to a synthesis the demand for which becomes louder and louder as our contemplation of human problems deepens.

Thus we are again led a step closer to the recognition that the problem we are dealing with is a psychological one. It is not a question of scientific logic or truth; it is not a question of theological or religious truth; it is not a problem of philosophical truth in the broadest sense of the word. Rather it is a problem of the psychological functioning of man, which functioning must be understood, if man's mind is not to stand in man's own way and thus prevent him from understanding that which he can and ought to understand clearly.

Let us observe that the intensity of the apparent conflict between science and religion seems to be fed co-operatively by science and religion in a very singular way. The scientist, as was pointed out, tends to try to answer questions of ultimate truth and ultimate knowledge—but these are not scientific questions at all. As Etienne Gilson so well puts it, they are religious questions. "If they (the scientists) don't ask religious questions, scientists will never be offered religious answers. Nor will these religious answers ever pretend to be scientific ones. Religious wisdom tells us that in the beginning God created heaven and earth, but it does not pretend to gives us any scientific account of the progressive formation of the world. As Thomas Aquinas aptly says, precisely about this very text, there were things which Moses could not express to an ignorant people without using images which they could understand." (8)

One could hardly find a more authoritative and more lucid statement. Gilson who is a profound scholar, a great student of Thomas Aquinas, and a man of an immense philosophical perspective which is as great as his lucidity and intellectual tolerance, calls our attention to the changing conceptions of the universe from Newton through Einstein to de Broglie and Heisenberg. He is impressed with the "decreasing longevity" of the various scientific conceptions of the universe. The system of Ptolemy lived fourteen centuries; the Copernican lasted only three centuries; that of Einstein less than a quarter of a century, to be replaced by the newer conceptions of Heisenberg and other contributors to micro-physics. Gilson concludes that while the progress of science continues at a steady pace ". . . the fact remains that, by reason of its accelerated progress, modern science is exhibiting an always decreasing stability." (9) As to the scientists themselves, "Confronted with their own amazing discoveries, they entertain no doubt about their truth, but they are beginning to wonder about their very possibility. 'What is most incomprehensible about nature,' Einstein says, 'is its comprehensibility.' As to Louis de Broglie, in one of the most remarkable chapters of his book on physics and micro-physics, he makes this almost identical remark: 'What is most marvellous about the progress of science, is that it has revealed to us a certain concordance between our thought and things, a certain possibility for us to grasp, through the resources of our intelligence and the rules of our reason, the deep-seated relations that obtain between phenomena. We do not wonder enough about the fact that some scientific knowledge is possible.'" (10)

Gilson is moved to comment on this in the following manner: "This remarkable statement clearly shows that nothing equals the ignorance of modern philosophers in matters of science, except the ignorance of modern scientists in matters of philosophy." (11)

For ". . . the question of the possibility of science is not itself a scientific question. Any attempt to answer it in a scientific way results in a vicious circle, since a scientific demonstration of the possibility of science implies the existence of science whose possibility it tries to demonstrate." (12)

Let us then agree with Gilson in the unavoidable and the only possible conclusion. He states ". . . Since the only way for us to account for the intelligibility of the world is to resort to a cause whose nature and operation made it to be, and to be intelligible the answer to the problem must needs be found in the crowning part of metaphysics, that is in that part of it which deals with the first principle and the highest cause. If there is such a cause, its name is God. In short, the only discipline that can answer this question is divinity, or theology. Now I quite agree that, to many scientists, philosophical or theological answers do not sound serious. But this is beside the point; for indeed it would not be serious to give metaphysical or theological answers to scientific questions; but the question asked by these scientists is not a scientific one; science never worries about its own possibility: were science not possible it could not exist; that is all. What is now happening is that on the basis of their scientific knowledge some scientists are beginning to ask metaphysical and theological questions. And they are welcome to do it but if they do they will have to look for metaphysical and theological answers." (13)

In other words, science does keep on attempting to give scientific answers to theological and metaphysical questions, and in doing so it does not even notice that it strays from the path of science. One wonders why. I have repeatedly asked this question, in one way or another. A tentative answer suggests itself. First of all, let us recall what was said about the ever-changing conception of the universe from Ptolemy to de Broglie. As Gilson put it: "Like the Patriarchs of the Old Testament, they seem to obey a law of diminishing longevity." (14) The whole aspect of physical determinism and scientific previsibility has changed. We live more and more in a world of "innumerable elementary indeterminations." This means, says Gilson, "that the strictly determined mechanical world of dialectical materialism, which Marxists still mistake for the world of science, died twenty-five years ago. They don't seem to know it yet." They don't seem to know it yet because science which misconceives its explanation of the mechanics of a phenomenon for an ultimate explanation of the phenomenon itself, this type of science cannot give up its misconceived metaphysical position without giving up the very worshipping of the human mind of which mention was made above.

The issue is then, not the attitude toward theology or metaphysics or religion, or science itself. The issue is the attitude of man towards his own mind, which is charged with utmost narcissistic cathexes. The theologians who since the beginning of the Jewish faith and throughout the Christian Era considered the human mind, the power to reason and to comprehend, the very essence of man, were always inclined to believe that to have been created in the image of God meant to have been endowed with reason, with the power of understanding of the very depths of Nature and man and the Creator himself, even though the latter mystery might be revealed to very few. Thus the image of the Lord does not seem to mean something anthropomorphic, corporeal and material. The anthropomorphic idea of God is born out of the limitations of man's narcissism, whereas the image of God as just presented appears to be a gift, a result of an act of great generosity bestowed upon the human animal, who in its divine enlightenment learned to worship the image, be thankful for the gift in a manner both humble and wise.

This religious attitude is essentially different from the narcissism which is displayed by scientism toward the human mind. The scientistic orientation is of a special psychological brand particularly when it concerns social sciences and psychology. For here we deal with man's persistent even though illusory conviction that he alone, by the very act of acquiring scientific knowledge and out of this neutral, gadgety knowledge, can acquire the knowledge of the ultimate purpose of mankind's living as well as the power to transform man into that image of man which science in its simple technical unwisdom and skilful sagacity believes it knows and understands. This is the true difficulty of present-day scientific psychopathology, as it is the difficulty of all kinds of scientism. For after all this is a difficulty arising out of the over-estimation of man's own self-contained importance. It is a form of megalomania which is inevitable in all cases of severe narcissism: it is a fantasy of a power and wisdom which do not exist in man. Suffice it to recall the shock experienced by so many atomic scientists after Hiroshima, their moral anguish and wish to arrest the march of their devilish knowledge.

Since present-day scientific psychopathology, even more than physics, seeks to take a dominant place in the hierarchy of human endeavours and a leading role in the business of human relations, it is naturally confronted with the dour and grim truth that as a science it possesses no more wisdom nor charity than the physicists who split the atom and made the bombs and became stunned by the horror of their handiwork.

The problem is acute, and potentially very dangerous. For, after all, throughout centuries religion was the one and only human activity which concerned itself with man's relation to God, to eternity, to salvation. It was the only inner spiritual discipline which conceived of and understood the deep interdependence among men, the great yearning for a mankind which would become a real brotherhood of men. It cannot surrender these concerns and aspirations to scientific psychology and sociology, because it cannot give up the very essence of what it is, the deep respect and concern for the human person as a person, as a unique creation which is both so very individual and yet so completely one with his brethren and the world as a whole. That which modern psychology would designate as an unconscious sense of guilt is not sufficient to cover the sense of the individual's responsibility for his fellow men and his sense of community duty in relation to each living individual. Scientific psychopathology, like any science, is unable to understand this ethico-religious sense of guilt which transcends the usual unconscious mechanisms producing what Freud called the precipitate of the Oedipus complex and the neurotic sense of guilt. It is unable to understand this sense of guilt even though it may be able to describe the psychological mechanism of the sense of religious responsibility, of sinfulness ". . . to expose the psychological or sociological origin of a belief is not at all the same thing as proving it false. To suppose that it is, is to adopt the attitude of Ebenezer Bulver's wife, who when her husband insisted that two sides of a triangle were together greater than the third, replied, 'you only say that because you're a man.'" (16)

Yet how much contention and intolerance burn around the assertion that the more scientific psychopathology and sociology become, the more crying is the need to recognize that the megalomania of the self-adoring human mind is by no means a sign of its true greatness! It is this, I am sure, that Einstein had in mind when he said that "Science without religion is lame, and religion without science is blind." (17) To avoid this blindness and this lameness, it is necessary to accept the truth of John Donne's trenchant words: "No man is an iland, intire of itselfe; every man is a peece of the Continent, a part of the Maine; if a Clod bee washed away by the Sea, Europe is the lesse, as well as if a Promontorie were, as well as if a Mannor of thy friends or of thine owne were: any mans death diminishes me, because I am involved in Mankinde. And therefore never send to know for whom the bell tolls; it tolls for thee." (18)

The melancholy but uplifting truth of these words serves to underscore the singular character of the psychological origin of the conflict between present-day scientific psychopathology and religion. When I say psychological origin, I mean to say that there is no real conflict between these two aspects of revealed truth, science and religion. What I mean to say is this: scientism involves man with himself and yet drowns his individuality in statistical averages; but man cannot be abolished, and therefore he cannot help but strive to remain alive. If he strives to save himself by devotion to scientism, he gets dissolved in the freakish light of his delusion of megalomania, and like the schizophrenic who fills his world with delusions he dies while staying physiologically alive. If, on the other hand, he seeks salvation away from life, he again achieves but living perdition, because he who abandons scientism so often throws out with it science itself, and then his apparently religious views are bound to be distorted, since one cannot accept and submit oneself to the will of God while rejecting one of His greater creations—science, the true knowledge and partial mastery of Nature.

I might seem to have left out of consideration the contentious arguments which are always teaming around such issues as the soul as the psychologist sees it and as religion views it. This I have done deliberately, for it must be clear by now that I cannot admit that the scientific psychologist *qua* psychologist and *qua* scientist is ever able to learn anything about the soul. If he claims to give a scientific description of it, he merely deludes himself by mistaking the manifestations of a phenomenon for the phenomenon itself; if he senses and knows what a human soul is, he perceives it with humble awe and he would never attempt to make a scientific analysis of it—any more than he would attempt to make a scientific analysis of beauty, or greatness, or sacrifice, or a sense of responsibility.

Perhaps the best way of bringing this long statement to a fitting close is to cite the words of the Lutheran theologian Professor Paul Tillich who in an essay on "Jewish Influences on Contemporary Christian Theology", recalls the contributions of the contemporary Jewish religious philosopher Martin Buber, and says that because of scientism (he does not use this word) we get lost as persons and become engulfed in a conflict for which there should be no place in the life and functioning of the contemporary scientific mind. There ought not to be any conflict, if we allow ourselves to understand the nature of what we lose by trying to gain the illusion of complete mastery by means of scientism. For, under influence of the latter, science does become lame, because "Men become things, living beings become mechanisms, thinking in universals replaces the encounter with individuals. Men are made into objects of calculation and management, of research and test, into means instead of ends. The I-Thou relation, the person-to-person encounter is lost. God himself becomes a moral ideal or a philosophical concept or a being whose existence or non-existence can be argued for. But a God who is an object is not God at all." (19)

The above underscores more than any other recent statement that I know the essential inner conflict of contemporary man—a conflict which is mistaken for an objective, true factual conflict between scientific psychopathology and religion. This conflict is best illustrated by the development of Freud's own thought and psychoanalysis. On one hand the author of psychoanalysis wished to remain a biologist, a logical positivist, a devotee of scientism, and on the other he made the greatest contribution toward the rejection of disindividualized scientism; for the method of psychoanalysis is the method of the ever-deepening study and recognition of man as a person, not man merely as a statistical datum. In other words, psychoanalysis—like all the other sciences of man and Nature during the last half-century—reflects the same and almost eternal and truly tragic conflict between man's striving to become the engineer of the world in which there are millions of population but not a single self-conscious individual, and man's yearning to preserve his being in complete unity with the One in whose image he was created.

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THE NATURAL HISTORY, TREATMENT AND PROGNOSIS OF ANOREXIA NERVOSA, BASED ON A STUDY OF 38 PATIENTS

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From the Bethlem Royal and Maudsley Hospitals

INTRODUCTION

SINCE the time of Sir William Gull (1874), the condition he called anorexia nervosa has been recognized as, primarily, a psychological disorder. Yet with the exception of some American contributors, it has recently received attention mainly from physicians (Ryle, 1936; Sheldon, 1937; Hubble, 1952) and from endocrinologists (Fraser *et al.*, 1941; Reiss, 1943). Its place in psychiatric semiology remains uncertain; at different times anorexia nervosa has been regarded as a neurosis, or as allied to schizophrenia, or to manic-depressive psychosis, or even as an entity *sui generis*. Recent reports have been largely concerned with three aspects of the disorder. First, with the essential features of the clinical picture, and the type of personality in whom it develops; DuBois (1949), and others for instance regard the condition as a compulsion neurosis arising in the obsessional character. Secondly, attention has been directed to its place amongst the psychosomatic disorders (Cobb, 1950), and with the interaction of emotion, the hypothalamus, and the endocrine system. Decourt and Michard (1950) in an interesting clinico-pathological study, have discussed the amenorrhoea and loss of weight, in the light of assays of urinary sex hormones and gonadotropins. Thirdly, treatment has been re-considered, and American writers in particular have advocated psychotherapy of a more prolonged and radical kind than was formerly thought to be necessary.

The present study was undertaken principally to elucidate the prognosis. The findings have been published elsewhere (Kay, 1953). During the investigation the case-records of the patients selected for the prognostic study were examined in detail, and form the basis of the present report. It is our intention to present a critical review of the syndrome, and to particularly direct our attention to the three aspects described above.

MATERIAL AND METHODS

It is clear that a multitude of disorders may give rise to anorexia and loss of weight. The criteria on which a diagnosis of anorexia nervosa is made must therefore be explicitly stated. Nemiah (1950), in an excellent, but not entirely comprehensive review, selected patients who showed a failure to eat, weight loss, and menstrual changes, for which no evidence of gross disease had been found in a primary etiological role. The most extensive psychiatric study is that of Carrier (1939), whose monograph is based on 36 cases studied on the whole over relatively short periods. His criteria are similar to those of Nemiah, i.e. a progressive restriction of "alimentation", wasting, and amenorrhoea. Male cases are excluded from both studies. It is important at once to state that these are the presenting symptoms of the disorder, any psychiatric symptomatology being given a minor role by the patient. Using these three criteria of disturbance of eating, loss of weight, and amenorrhoea, we examined the records of patients attending the Maudsley Hospital between 1932 and 1952. Thirty-four cases were found. In addition four male patients who had been diagnosed as suffering from anorexia nervosa were included. An attempt was made to contact each patient, and the results of this follow-up study have already been published (Kay, 1953). Our present review is based on our long-term knowledge of these thirty-eight cases. Attention will be directed in this paper to the hereditary background of the patients, their childhood and family situations, the illness, the treatment, and the outcome. The case histories are recorded in the Appendix.

(1) The Illness

Thirty-four patients were women, 4 men; 6 were married at the time of admission. Seventy per cent. had fallen ill before the age of 26, the majority between 16 and 20 years, 5 patients before 16, and 3 over the age of 35. One-half had been ill for 2 years or longer, 20 per cent. for over 4 years; half had already been treated in other hospitals as cases of anorexia nervosa. The mean of the lowest weights recorded was 6 stone 3 lb.

The clinical features of our cases are similar to those described by Ryle (1936), and Richardson (1939), and will not be discussed systematically. Attention will be devoted to specific aspects of the disorder.

(a) *The precipitating factors, modes of onset, and development of the disorder*

In two-thirds of our group environmental changes seem to have precipitated the illness, commonly a disturbance in inter-personal relationships (11 cases). Two patients lost their fathers by death (Case 5), or by engagement to a young woman (Case 3). Two fell ill when their favourite sisters became engaged (Cases 1, 13); three had lost their fiancés through death or broken engagements, (Cases 23, 25, 27). Two fell ill shortly after marrying (Cases 6, 17). The husband of Case 22 had just been posted overseas. Case 26 learned that her mother had become pregnant. Two other patients had been emotionally disturbed since the father died (Case 9), or left home (Case 31), two and four years respectively before the beginning of the illness proper. Eight patients (Cases 4, 9, 10, 12, 14, 19, 30, 37) fell ill immediately after or during a physical illness. This illness directly interfered with, or drew attention to eating in four cases. In Case 34, the illness began six months after an attack of jaundice, when she was advised by her doctor to avoid fatty foods. Case 11 suffered an exacerbation of symptoms following jaundice. Of the other six patients, two had just begun work for the first time; two were homesick after joining the A.T.S., one attributed her illness to the air-raids; and one had been sexually assaulted. In the remaining twelve patients, no clear-cut environmental changes could be found; amongst them are the majority of patients who dieted to avoid becoming fat.

Cobb (1950), has made "voluntary dieting" one of his criteria for the diagnosis of anorexia nervosa. In our cases, a motive was given for the dietary restriction by 16 patients (42 per cent.), (Cases 1, 3, 7, 9, 15, 16, 25, 28, 30, 31, 32, 34, 35, 36, 37, 38). Ten (Cases 3, 16, 25, 28, 30, 32, 34, 35, 37) stated that they abhorred fat people or the idea of becoming fat. Case 9, when in hospital for appendectomy said "Thank goodness for a rest", and prolonged her stay by postprandial vomiting. Three patients (Cases 16, 36, 38) felt that food harmed them in some way. Case 7 starved herself to "save money", and for religious

DATA

Case No.	Sex	Age at Onset	Age on Admission	Age, Health and Personality of Parents Occupation of Fathers	Total Family Situation	Family Attitudes and Interrelationships	Neurotic Traits (N) Feeding Problems (F) in childhood	School (S) and
1	F	17	19	M: aet. N.K. Very unstable. F: d. pulmonary tuberculous.	No details known. Several siblings; position not known.	Pt. devoted to an elder sister.	N.K.	Go
2	F	18	20	M: aet. 45. Healthy. Cheerful. Facial tic. Operation for gastric ulcer 9 years ago. F: aet. 48. Healthy, cheerful. *Accountant's Clerk.*	Happy home life, lower middle class. Patient the only child.	Good relationship between M. and F. and between parents and pt. (says M.). History suggests pt. is too dependent.	—	G Po
3	F	16	16	M: d. aet. 34, patient then aet. 3. F: aet. 52. Clever, domineering. *Engineer,* professional status.	Pt. "boarded out" with several families after M.'s death. Very unhappy. Boarding school aet. 10. Pt. the only child. F. remarried, pt. 16.	F. "obstinate, lacking imagination, domineering" (pt.). Pt. always felt rejected by him.	N & F	Go (S
4	F	30	31	M: aet. N.K. Healthy, not nervous. F: aet. N.K. Healthy. Thoughtful and intelligent. *Manager of Store.*	Superior working class family living in poor neighbourhood. Pt. 3rd of 7 (3 Bs. and 3 Ss.).	F. thought pt. a "tomboy"; not on intimate terms with her.	—	
5	F	24	28	M: aet. N.K. Healthy. F: d. cancer, pt. aet. 25.	Family strict Jews. Emigrated from Poland when pt. young child. Pt. 2nd of 3 (1 B., 1 S.), also elder ½B.	No details.	N & F	
6	F	21	25	M. aet. N.K. Nervy and bad-tempered. F. d. when pt. aet. 12. *Army Officer.*	F.'s death forced pt. to work immediately after leaving school. B. ran away to join R.N. Pt. elder of 2.	Open hostility between pt. and M. Pt. worried about brother.	F.	
7	F	29	34	M. d. aet. 64, when pt. aet. 31. Healthy. F. d. aet. 60, when pt. aet. 14. *Bootmaker.*	Pt. lived with her sister after 10. Pt. 5th of 6 (3 Bs. and 2 Ss.).	Pt. always felt parents preferred younger B; "neglected". Never happy, solitary, at home.	N & F	Go (S &
8	F	35	38	M. aet. 70. Nervous and worrying. F. aet. 72. Nervous and worrying.	Pt., the 4th of 5 children was left at home to look after ageing parents.	Pt. resentful of her siblings' freedom. Never able to play with other children.	N.K.	
9	F	31	35	M. aet. 36. Moody, unkind. F. d. aet. 63, cancer of oesophagus, with anorexia, vomiting (pt. then aet. 29).	Pt., youngest daughter, did the housework. 4th of 7 (3 younger brothers).	M. difficult, has favourites among the siblings; always disliked pt. Pt. attached to F., indifferent to M.	N.	
10	M	24	25	M. aet. 50. Healthy, cheerful, sensible, but "drinks like a horse". *Caretaker.* F. d. aet. 29 (P.T.), pt. aet. 13 months. *Bookseller's Assistant.*	Pt. brought up in Orphanage till 14½. Pt. the elder of 2 brothers.	M. sympathetic to pt.	N.	Po (
	M	9	13	M. aet. 34. "Never the same" since mastoiditis aet. 15. Headaches, digestive troubles, with intolerance of fats. F. aet. 41. *Silver-fox Farmer.*	"Very happy family; pt.'s health the only worry." M. ill, away from home, pt. aet. 5-7. Pt. eldest of 3 brothers.	M. overprotective; pt. very fond of her. Pt. less fond of F.	N & F	
12	F	35	38	M. aet. 60, with rheumatism, and chronic gastric ulcer; "neurotic" in recent years. Mild alcoholism. F. aet. 61. Alcoholism. *Compositor.*	Family happy and united. Pt. as a child had to help a lot in the home (M. and Sibs. ill). Pt. the eldest of 3 (1 S., 1 B.).	M. tries to influence pt. and prejudice her against her friends. General anxiety in family after pt. aet. 8, owing to illnesses of M. and siblings.	F.	
13	F	16	19	M. aet. 46. Anaemic, with asthma and rheumatism. "Slow-witted"; placid F. aet. 49; asthmatic.	Home economically secure. Parental relations strained, F. unfaithful; no quarrelling. Pt. 3rd of 4 (2 elder Bs. and 1 S.).	M. understanding with pt. F. very strict; children respected, not loved him; "hard and tyrannical". Pt. and sister inseparable.	N.	G P (
14	F	39	43	M. aet. 69. Several times in mental hospital. *Actress.* F. d. aet. 33 (P.T.), pt. aet. 3. *Actor.*	No settled home or family life; pt. moved about with M. living in lodgings. Pt. elder of 2 sisters.	No details.	—	G
15	F	20	27	M. aet. 49. Mild paranoid symptoms at menopause. *Publican.* F. aet. 49. Never ill. *Clerk.*	Pt. the only child.	F. says, "M. will do anything for her, and she (pt.) laps it up". Pt. sometimes irritable with M.	N & F	C P (
16	F	16	16	M. aet. 30. Rather worrying. F. aet. 53. Healthy. Calm, easy-going. *Caretaker.*	Financial stress, F. has been unemployed, once owned own business. M. away from home, pt. aet. 10-12. Pt. the elder of 2—one brother.	M. not strict, but "very kind and persevering" (pt.); had "no time" to look after or play with the children, and Pt. felt neglected.	N & F	F (
17	F	24	27	M. aet. 55. Highly-strung. F. aet. 66. Very nervous. *Civil Servant.*	"Old-fashioned standards" at home. Pt. youngest of 3 (2 elder Brothers).	Both parents strict. F. domineering, wanted pt. to excel at work. Pt. says she does not get on with F.	N & F	F
18	M	41	45	Family history "negative"; no details.	No details.	No details.	—	
19	F	22	24	M. aet. 62. Healthy; nervous during air-raids. F. aet. 62. Jovial. *Motor Engineer.*	Happy home. Pt. 3rd of 5 (2 Bs. and 2 Ss.).	No details.	N.	(
20	F	22	24	M. aet. 53. Fussy and highly-strung. F. aet. 48. Migrainous and hypochondriacal. *Civil Servant.*	Parents tried to keep up higher social standard than income warranted. Pt. the only child.	M. overprotective but indulgent with pt. Described as "irrational in her possessiveness" during pt.'s illness. F. shows similar attitude.	—	
21	F	20	20	M. aet. 52. Diets during attacks of gastric pain. Over-anxious. F. aet. 60. Healthy, sober, easy-going, sweet-natured. *Railway Signalman.*	Happy home life in small country village. Pt. youngest of 5 (1 B., 3 Ss.).	Both parents affectionate. Pt. F.'s favourite.	N & F	(
22	F	32	33	M. aet. 77. Healthy. F. d. aet. 78. Spinal disease for 25 years. Very kind and sensible. *Builder.*	Happy, comfortable home life. Pt. 9th of 10 (5 Bs. and 4 Ss.).	M. very strict, kept pt. from all forms of over-exertion. Pt. sometimes felt afraid of her; but very friendly with F.	N.	
23	F	18	19	M. aet. N.K. Nervous, obsessional. *Cook.* F., Canadian, d. when pt. aet. 3.	Bigamous marriage in Canada. No home for pt. from 7-14. One elder sister.	M. never speaks of F. and had destroyed all photographs. She fusses pt. and is over-anxious.	N.	
24	F	21	23	M. aet. N.K. Worries excessively. F. d. pneumonia when pt. aet. 5. *Mechanic.*	Pt. says M. was not happily married. Pt. 4th of 5 sisters.	Pt. "devoted" to M. and sisters.	N.	
25	F	24	33	M. aet. 47. Nervous, self-willed. Ill at every confinement. Legs partly paralysed at F.'s death, when pt. aet. 14. F. moody, fastidious, refused food if fly touched it.	Looked after by Aunt 1st year of life. Pt. the 2nd of 3 sisters.	M. impatient, says would rather see pt. "dead than mental". Refused permission for E.C.T. Pt. says neither M. nor Ss. understand her.	N & F	
26	F	18	18	M. aet. 40. Bad-tempered, mean, nagging, unstable. Stepfather aet. 59. "Stupid." *Metal-worker.*	Pt. illegitimate, F. unknown. Barnardo's Homes till 4; foster-parents till 7. Ran away from own home when 16. 2 younger ½-sibs. (1 B. and 1 S.).	M. quarrelled with pt. took away her wages. Once injured her. Hostility on both sides. Stepfather beats pt.	F.	(
27	F	22	24	M. aet. 53. Healthy. F. aet. 61. Blustering, hen-pecked, bound up with his work. *Dentist*	Prosperous home. F. about to retire. Pt. youngest of 3 (1 B. and 1 S.).	M. overprotective. Pt. very dependent, calls M. "marvellous", etc. Pt. does not get on well with F.	N.	

ROM PERSONAL HISTORIES

					THE ILLNESS					
	Intelligence	Previous nervous illness	Age at Menarche	Sexual maladjustment	Precipitating Factors	Fear of becoming "fat"	Predominant Clinical Features	Early Amenorrhoea	TREATMENT	OUTCOME
D S)	N.K.	—	N.K.	+	Sister became engaged		Depressed; conscious motive.		—	DIED in hospital soon after admission. P.M.: "Bronchopneumonia and Inanition".
OD S) R V)	N.K.	—	14		Beginning work.		Inert; hypochondriacal.		Modified Insulin. Psychotherapy.	(IMMEDIATE): recovered. (16 YEARS): fluctuating course. Married aet. 29, frigid; one child; divorce. Lives with parents. Neurotic. Vegetarian. Hysterectomy (menorrhagia) aet. 36. WT.: 9 stone.
D	"High I.Q."	—	12		Father became engaged.	+	Depressed and hysterical.	+	Endocrines. Psychotherapy.	(IMMEDIATE): not improved. (16 YEARS): fluctuating course. Periods of depression and amenorrhoea. Married, frigid; one child. WT.: 6 stone 13 lb.
	N.K.	—	14		Series of operations.		Inert. Indifferent.	+	Endocrines.	(IMMEDIATE): no change. (16 YEARS): ill until hysterectomy (menorrhagia) aet. 39. DIED aet. 47, Malignant Hypertension.
	N.K.	—	N.K.	+	Death of father.		Depressed, hypochondriacal. Asthma.		Endocrines.	(IMMEDIATE): improved, menstruated. (15 YEARS): relapsed, admitted Obs. Ward and M.H. Later, married, one child. Menses normal. Attends O.P.D. for asthma. Thin.
	N.K.	+	N.K.	+	Marriage.		Irritable.	+	Endocrines.	(IMMEDIATE): no change. (LATER): DIED in 6 months after appendicectomy.
OD W)	N.K.	+	12	+	—		Religious and masochistic phantasies. Pellagra.		Diet, Vitamins.	(IMMEDIATE): no change. (16 YEARS): eccentric spinster, with chronic malnutrition, pellagra; menses never regular. WT.: 6 stone 4 lb.
	N.K.	+	19	+	—		Conversion hysteria.		Diet and Endocrines.	(IMMEDIATE): improved. (15 YEARS): fluctuating course. Neurotic. Menses never regular. Married. WT.: 10 stone.
	N.K.	—	N.K.	+	Appendectomy.		Hysterical attitudes.	+	Diet. Psychotherapy.	(IMMEDIATE): improved. UNTRACED.
OR)	N.K.	+	—		—		Inert, depressed.	—	Diet and Endocrines.	(IMMEDIATE): improved. UNTRACED.
	Cattell 140 Kohs blocks 117	+	—		—		Severe phobic state.	—	Diet, endocrines. Psychotherapy.	(IMMEDIATE): not improved. (15 YEARS): improved over 2 years. Now, able to work, but "lacks everyday judgment"; no details.
	N.K.	—	14		Increase in symptoms of rheumatic carditis.		Anxious and hypochondriacal.		Diet. Digitalis.	(IMMEDIATE): improved. (LATER): DIED in 2 years from Cardiac Failure.
OD) OR)	N.K.	+	12	+	Favourite sister became engaged.		Variably depressed or indifferent.		15 Insulin Comas. Psychotherapy.	(IMMEDIATE): not improved. UNTRACED.
OD)	N.K.	+	12	+	Fractured leg in accident.		Inert and semi-stuporose.		Diet.	(IMMEDIATE): improved. UNTRACED.
OD) OR)	N.K.	+	16		—		Panic attacks, depression.		Endocrines. Psychotherapy.	(IMMEDIATE): improved. (12 YEARS): gradual recovery. Married, frigid; 2 children. Menses normal. WT.: 9 stone 9 lb.
OR)	N.K.	—	14	+	—	+	Tense; self-reproachful; hypochondriacal.		Diet.	(IMMEDIATE): no change. (LATER): DIED aet. 18, Tuberculous peritonitis.
OR)	N.K.	+	14	+	Marriage.		Hysterical symptoms and motivation.	+	Diet. Psychotherapy.	(IMMEDIATE): recovered. (13 YEARS): relapsed, readmitted. Good social recovery. Neurotic. Persistent amenorrhoea. WT.: fluctuates.
	N.K.	+	—		—		Depressed, hypochondriacal.	—	—	(IMMEDIATE): no change. (LATER): found drowned soon after discharge.
OD)	N.K.	—	14	+	Mastoidectomy.		Hysterical.	+	Diet. Psychotherapy.	(IMMEDIATE): much improved. (8 YEARS): fluctuating course. Avoids home. Vomits. Menses irregular.
	N.K.	—	17		Homesick in A.T.S.		Indifferent. Childish.		N.K.	(IMMEDIATE): not improved. Discharged. (8 YEARS): slow recovery. Married, one child. Menstruated after 8 years. WT.: 7½ stone.
OD)	N.K.	—	13		?Otorrhoea.		Cheerful. Wanted to return to duty.	+	None.	(IMMEDIATE): recovered. Completed Service. (8 YEARS): no relapse. Dislikes fried or fatty food. Recurrent nausea relieved by operation for C.S.O.M. Menses normal. WT.: 7 stone 12 lb.
	N.K.	—	12		Husband posted overseas.		Tense, aggressive. Indifferent.		Modified Insulin.	(IMMEDIATE): no change. (8 YEARS): normal weight and menses. Neurotic.
OD) OR)	"High-average I.Q."	+	12	+	Death of fiance.		Tense, inert. Asthma.	+	For Asthma.	(IMMEDIATE): transferred to M.H. "improved". but asthma attacks very severe. UNTRACED.
OD)	N.K.	—	15		?Homesick in A.T.S.	+	Agitated, suicidal; paranoid ideas.	+	Diet.	(IMMEDIATE): transferred M.H. after suicidal attempt. (7 YEARS): 2 further admissions to M.H.: "Schizophrenia". Now married; menses normal. WT.: 7 stone 10 lb.
	"Average I.Q."	+	16		Broken engagement.		Retarded, wanting to die.	+	Tube-feeds. Thyroid.	(IMMEDIATE): no change. (7 YEARS): still very ill; depressed; Amenorrhoea. Severely anorexic. WT.: 5 stone 7 lb.
R W)	"Low I.Q."	+	16	+	Mother became pregnant.		Hysterical behaviour.	+	Diet.	DIED in hospital. P.M.: "Anorexia nervosa".
D	Matrix 122 Mill Hill	+	14		Broken engagement.		Chronic obsessional neurosis.	+	Psychotherapy.	(IMMEDIATE): Slightly improved. (5 YEARS): Leucotomy. Now, normal menses; neurosis improved. WT.: 10 stone 10 lb.

	Matrix 100 Mill Hill 135	—	13	+	—	+	Depressed, aloof. Emotional outbursts.		Psychotherapy.	(Immediate): no change. (3 Years): not improved.
	"Low I.Q."	—	14		?Air-raids.		Depressed. Tuberculophobia.		Diet. Psychotherapy.	Died in hospital from fulminating Pulmonary Tuberculosis.
D	N.K.	—	13	+	Pleurisy.	+	Unconcerned. Hysterical outbursts.		Diet. Psychotherapy.	(Immediate): worse. (4 Years): under treatment for P.T. Moody. Appetite poor. Amenorrhoea. Wt.: 7 stone 9 lb.
R W)	Matrix 88 Wechsler 79 Binet 62 Porteus 64	—	14		Sexual assault.	+	Depressed, irritable.	+	Modified Insulin. Social work.	(Immediate): not improved. (3 Years): insomnia, depressed spells; dislikes going out; no friends; dissatisfied; no job. Living at home again. Menses normal. Wt.: 8 stone 3 lb.
D)	Matrix 122 Mill Hill 100	+	11½		—	+	Mixed hysterical and depressive picture.	+	Psychotherapy.	(Immediate): no improvement. (3 Years): fluctuating course. Attending Dr. for faints and agoraphobia. Appetite faddy. Menses irregular. Wt.: 8 stone.
R)	Matrix 98 Mill Hill 89	+	14	+	—	+	Depressed, suicidal attempt.	+	(i) Diet. (ii) Leucotomy.	(Immediate): (i) Improved, relapsed. (ii) Improved. (One Year): Gained 2 stone in weight. Menses.
D)	Wechsler 109	+	11½	+	Jaundice 6 months earlier.	+	Variably depressed; hysterical indifference.		Psychotherapy.	(Immediate): improved after 1 year's O.P. psychotherapy. (3 Years): fits of depression, fears of becoming fat. Menses normal. Wt.: 9 stone 7 lb.
D)	Wechsler 131 Matrix 124 Mill Hill 108	+	12		—	+	Anxious, phobic, obsessional.		Psychotherapy.	(Immediate): improved mentally, no gain in weight. (3 Years): deteriorated after discharge. Family emigrated to Tasmania.
D) R)	Matrix 120 Mill Hill 143	+	—		Beginning work.	—	Hypochondriacal ideas.	—	(i) Psychotherapy. (ii) E.C.T.	(Immediate): (i) No change. (ii) Gain of 1 stone. (2 Years): Sanatorium for P.T. Morbid interest in diet. Wt.: 10 stone.
R) D)	Matrix 120 Mill Hill 92	—	14	+	Furunculosis and diet.	+	Listless; denies being ill.		Diet. E.C.T.	(Immediate): no change. (One Year): "too weak to work"; insomnia. Spells of bulimia. Amenorrhoea. Wt. increasing.
D)	Wechsler vocab. 98; blocks, 110	+	11	+	—		Hysterical attitude.		Tube-feeds.	(Immediate): no change. Vomited tube-feeds. Refused other physical treatment. Took own discharge. (Chronic case, treated for first time.)

28	F	20	27	M. aet. 51. Gastric trouble when young. Neurotic and fussy about food; avoids fats. F. aet. 59. *Tea Merchant* in Ceylon.	Pt. separated from parents when she went to school aet. 9. Pt. 2nd of 4 sisters.	M. dominant, disciplinarian. Over-anxious with all the children; disappointed not having son. Pt. unhappy away from her. F. "kind and fair" to all the children. One S. pt.'s greatest friend.	—	
29	F	18	21	M. aet. 53. Stable. F. aet. 65. Normal health.	Irish family. Poor farming background. Pt. middle of 12 (one of dissimilar twins).	No details.	N.	
30	F	17	18	M. aet. 41. Healthy. F. aet. 41. "Anxiety neurosis" during War. Moody; always nervous; fussy over food. *Stockbroker.*	An apparently normal family. Pt. has a younger B.	M. "a tower of strength". Over-anxious, fussy about pt.'s food. Antagonistic after pt.'s discharge. No kissing between M. and pt. Pt. prefers F. to M. Pt. critical and resentful of young B.	—	
31	F	18	24	M. aet. 50. Invalid from heart disease. Weighs 17 st. Kind, but stupid. F. aet. 60. Cheerful, dogmatic. *Chauffeur.*	Parents never married; F. promiscuous, left home when pt. aet. 12. Home socially chaotic, economically unstable, psychologically disturbed. Pt. 8th of 9 (7 Bs.). Also 9 paternal ½-siblings.	M. not affectionate with pt. Interested in films and gossip. Pt. fond of F.; disturbed when he left home. Pt. says brothers sexually assaulted her.	N.	(
32	F	14	17	M. aet. 34. Very easily worried. Indigestion, diets, taken no breakfast of late. 5 years' nervous illness with falling sensations. F. aet. 42. Reserved, opinionated, irritable. *G.P.O. Engineer.*	Aunt wanted to adopt pt. as a baby, and pt. is aware of this. Pt. the only girl (3 younger Bs.).	Pt. "very, very attached" to M. who is not interested in family, not over-anxious about pt. F. "devoted to the children", but bullied pt. when she was ill. F. and M. quarrel.	N & F	(
33	F	23	27	M. aet. 53. Happy-go-lucky and stable. F. aet. 62. Neurotic, hypochondriacal, neurasthenic.	Pt. youngest of 3 (2 brothers).	M. feels patient is not trying. F. dominant member of family. Abnormal relationship to patient, particularly concerned with her eating habits. Pt. dislikes M.	N.	
34	F	15	17	M. aet. 44. Stable. F. aet. 50. Stable; reserved. *Carpenter.*	Integrated working class family, with few outside interests. Pt. 2nd of 3 (2 Bs.).	M. lenient with pt. except about meals and bedtime; attached to pt. and proud of her dependence. F. strict, once beat pt.	N.	C
35	F	16	17	M. aet. 42. "Calm over background of nerves". "Run down" since birth of twins. F. aet. 42. Long history of kidney stones. Excitable; bad-tempered; paranoid jealousy of M. Alcoholic. "Abnormal personality." *Draughtsman.*	Working class family. Pt. separated from M. for 8 months, during evacuation, aet. 7. Pt. eldest of 3 (1 B. and 1 S.).	M. very attached to pt. who regarded her as a sister. Pt. dislikes F.	N.	G
36	M	15	23	M. aet. 40. "Anaemic" till recently. F. aet. 41. Epilepsy aet. 15. Nervous, with colon trouble, 15 years. Gastric pains. Cool emotionally. *Insurance Broker.*	Pt. says M. wanted a divorce. An only child.	"M. over-protective—spoils me" (pt.). Much hostility was vented against F. when pt. was abreacted.	N & F	G (P (
37	F	22	22	M. aet. 47. Anxious, easily-worried, poor eater. F. d. aet. 52, when pt. aet. 12. Quick-tempered. *Florist.*	Pt. lived with Aunt called "fat and interfering", aet. 14-16. M. remarried, pt. aet. 15. One elder Brother.	(Stepfather): "M.'s word is law; pt. has not had enough love". But pt. apparently very attached to M. Also had good relationship with F.	F.	P (G (
38	F	18	33	M. aet. 62. Very quick tempered. F. aet. 80. Placid, but irresponsible. Often changed his work. *Commercial Traveller.*	Constant parental quarrels over financial difficulties. M. left home when pt. aet. 14, and children stayed with F. Pt. youngest of 6 (3 Ss. and 2 Bs.).	M. strict but kind. Children preferred her to F. who never showed affection.	N & F	G (

reasons, and Case 15 did so because "eating gave the face a high colour". Several gave more than one reason. It is clear that in many cases the alleged "reasons" were rationalizations, or indications of serious psychological disturbance. In comparing the patients who gave their reasons for not eating with those who were unable to do so, no difference in the clinical picture can be discovered, either in the course or outcome. In both groups are patients who complained of sometimes feeling hungry (Cases 3, 6, 11, 12, 15, 27, 32), or of having to force themselves to eat (Cases 21, 29, 37). No valid distinction can thus be made between patients who diet for a "reason" and despite hunger, and those who refuse food without apparent motive. A history of "voluntary dieting" probably depends on the intelligence of the patient, her ability to rationalize, and her willingness to discuss her symptoms, no less than on the psychiatrists' zeal in searching out "motives". Two patients may be contrasted; both fell ill after an elder sister became engaged; one girl (Case 1) said that by refusing to eat she hoped to force her sister's return home; the other girl (Case 13) was unable to eat owing to an insufferable repugnance for food, which she associated with dislike of her prospective brother-in-law, and especially his "disgusting eating habits". A voluntary act is, therefore, not essential to the syndrome.

The development of the illness varies greatly. Emaciation may progress rapidly and end within six months by death (Case 26); or the condition may become chronic, dating with little intermission from early or late childhood (Cases 7, 38). In the latter situation, precipitating factors cannot be identified. Moreover, admission to hospital may depend on chance events such as physical illness, both patients and relatives having become accustomed to the symptoms. Attempts at radical treatment prove ineffectual in such cases, but none the less, the patients continue to survive, and may even lead active, though restricted lives. Of nine patients (Cases 1, 4, 16, 17, 19, 23, 26, 30, 34) who had reached a low level of nutrition in 18 months or less, three eventually died. In seven the illness dated from a definite event or followed a series of physical illnesses.

(b) *Psychiatric Symptomatology*

The early symptoms, apart from anorexia and amenorrhoea, have been somewhat neglected by previous authors. Berkman (1939), in fact considered that anorexia nervosa can arise in mentally normal individuals. In fifteen of our patients anorexia and/or amenorrhoea were recorded as the first symptom of the illness. In the remainder, other symptoms were either contemporaneous (13 cases), or appeared before the anorexia or amenorrhoea (10 cases). These symptoms included: tiredness, irritability, depression, attempted suicide, headaches, insomnia, "fainting fits", phobias, loss of interest, inertia, hyperventilation attacks, concern over menstruation, abdominal sensations, bilious attacks, and constipation. In about ten patients the onset of the illness proper was difficult to date exactly. For instance, Case 20 suffered from insomnia and irritability following her father's death, but did not become anorexic until two years later. In fact, only five patients developed the syndrome in a setting apparently free from acute psychological disturbance; but these five all showed personality deviations, and in none was the course of illness particularly favourable (Cases 4, 19, 20, 30, 37). The variability and prolixity of symptoms early in the disorder suggest that loss of weight and appetite, and amenorrhoea, on which attention is later focussed, are but part of a complex emotional disturbance, with a varied psychiatric symptomatology. This has been described previously (Kay, 1953). The frequency of various symptoms is shown in

Table I, together with Slater's (1943) findings in his large mixed group of neurotic soldiers. There is fairly close agreement. Patients with anorexia nervosa are apparently contented with their physical state, and are seldom hypochondriacal. The higher rate of obsessive-compulsion symptoms may be related to the fact that more of our patients showed obsessional personality traits. The symptomatology was often mixed, or varied from time to time. Mood changes, fears, and hysterical symptoms, conspicuous in the earlier stages of the illness, tended to disappear as the typical pattern of behaviour became established, only to re-appear during the course of treatment.

TABLE I

Psychiatric symptomatology in this and in a mixed neurotic group. Figures given in percentages. Heavy type shows that differences between the groups are significant at the 1% level using χ^2 method.

	SYMPTOMATOLOGY					
	Mood change	Anxiety	Hysterical symptoms	Obsessive or Compulsive symptoms	Hypochondriasis	Organic and Psychotic symptoms
2,000 neurotic soldiers (Slater, 1943)	45	44	28	**3**	**41**	10
38 patients with anorexia nervosa (This study)	50	42*	40	**18**	**15**	8

Many patients can be diagnosed as suffering from hysteria (e.g. Cases 9, 17, 30), phobic (Cases 11, 16), or compulsion (Case 27) states, affective disorder (Case 14, 25), or psychopathy (Case 26), according to the predominant symptom of their illness. More often, however, the disturbance is generalized and arises in a setting of chronic maladjustment. Anorexia nervosa, as Cobb (1950) has pointed out, is a severe disorder, a "pan-neurosis". There is, however, no reason to believe that it is allied to schizophrenia, as has at times been suggested. In Case 16, this diagnosis was considered but not confirmed. Only one patient has subsequently shown schizophrenic symptoms (Case 24).

(c) *The Amenorrhoea*

In this series, amenorrhoea was reported before repugnance for food had arisen in 25 per cent. of the patients, and in another 25 per cent., the symptoms were contemporaneous. Sheldon (1937), has suggested a psychologically-determined "functional" pituitary deficiency in anorexia nervosa, because of the similarity with Simmonds' Disease. The early appearance of amenorrhoea might be accounted for on these grounds, for Hubble (1952), has shown that amenorrhoea is the most sensitive indicator of hypopituitarism. However, several objections may be put forward. Firstly, the mechanism producing the amenorrhoea must differ in half the cases, so that the patients would then fall into two groups. Klinefelter *et al.* (1943), on the basis of hormone excretion studies, suggested that this was in fact true. Clinically, however, the patients cannot be distinguished solely on the criteria of early or late amenorrhoea. Neither in their previous mental health, menstrual history, psychiatric symptomatology, course or outcome, can the groups so formed be shown to differ; in particular, somatic features attributable to endocrine deficiency can no more be found in the one, than the other. Secondly, Bartels (1946), in a detailed clinical and metabolic comparison of anorexia nervosa with Simmonds' Disease, concluded that "nearly every feature" of anorexia nervosa could be accounted for by the emaciation alone. The organism might "attempt to compensate for the unfavourable metabolic conditions (i.e. the malnutrition) through changes in the mid-brain pituitary system". Thirdly, the hormone assays of McCullagh and Tupper (1940), Fraser *et al.* (1941), and Klinefelter *et al.* (1943), have shown that urinary gonadatropins (F.S.H.) are often in the normal range, and are never consistently low as in hypopituitarism. Klinefelter *et al.* (1943) based their theory of two varieties of anorexia nervosa on the different quantities of hormone excreted by different patients. But unless such differences can be shown to be independent of the patients' nutritional and psychological state at the time of assay, they cannot be accepted as indicating distinct disorders. The hormone level is in fact known to fluctuate considerably in some individuals with anorexia nervosa (Escamilla, 1949). The hypothesis of a pan-hypopituitarism, however produced, occurring in the early stages, and influencing the whole clinical picture, runs counter to the evidence.

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* Includes phobic states.

Klinefelter *et al.* (1943), and Reifenstein (1946), put forward a different hypothesis to explain the mechanism of the amenorrhoea. The hypothalamus, under the influence of psychological disturbance, acts on the anterior pituitary to diminish production of luteinizing hormone. This mechanism may account for the so-called "psychogenic amenorrhoea" in other conditions, e.g. among probationer-nurses (McGregor, 1938), newly-joined Service personnel (Scher, 1946), and in depressive states. In such settings, there is little question of pituitary deficiency in the usual clinical sense; the mechanism of the amenorrhoea is specific, and therapy with the available anterior pituitary extracts is, as has been amply shown, quite fruitless. This concept of a "hypothalamic amenorrhoea", requiring some definite precipitating event to set it in motion, is in accord with the clinical data. In 14 cases with early amenorrhoea, there was a physical illness or clear-cut psychic trauma in twelve; in 16 cases with late amenorrhoea, such events could be found in six only. Thus early amenorrhoea may be related to an acute physical or emotional disturbance at the onset of the illness, and to have no other specific significance.

Some American writers (Waller, Kaufman and Deutsch, 1940), have suggested that the amenorrhoea and anorexia of these patients is related to phantasies of oral insemination and pregnancy. Here again is an attempt to find a single explanation for amenorrhoea and anorexia, which is difficult to accept without reservation. Our findings confirm that the patients are sexually maladjusted, but this is in accordance with their neurotic constitution. Four female patients received intensive psychotherapy, and phantasies linking eating and becoming fat with genital functions were brought to light. Such phantasies are probably common among adolescent girls, and amenorrhoea arising from any cause would seem especially likely to evoke them. The predominance of the disorder among women provides some circumstantial evidence in favour of this hypothesis, but at the best, this psychopathological explanation remains very insubstantial.

The effects of chronic anorexia on the endocrine system have been reviewed by Decourt and Michard (1950). Longstanding malnutrition may result in degenerative changes in the pituitary, but in anorexia nervosa three distinct mechanisms may be necessary to account for the amenorrhoea.

(1) A direct nervous action on the uterus, to explain the sudden cessation of the menstrual flow which may occur as the result of psychic trauma.

(2) A hypothalamic-pituitary mechanism of the kind described by Reifenstein (1946).

(3) The effect of chronic malnutrition on the endocrines.

If this last mechanism occurs, it is certainly rare. Menstruation may be resumed spontaneously even after many years' amenorrhoea, provided that normal weight is regained. Only one patient in our series has failed to menstruate for 19 years, although in other respects her recovery has been quite good. In this case, amenorrhoea occurred early in the illness, and the period of undernutrition was brief, so that the persistence of the amenorrhoea cannot reasonably be attributed to the effects of starvation (Case 17). Another patient was seen at the age of 50, 39 years after the first feeding difficulties at the age of 11, and 16 years after admission to hospital. The menses had always been very irregular. She weighed 6 stone and still ate very little. She was active and alert (unlike cases of pan-hypopituitarism) and showed intense aversion for even the discussion of food (Case 7). Her eating habits seemed still to be psychologically determined even after the lapse of many years. In two patients pregnancies occurred after amenorrhoea of six and eight years' duration (Cases 15, 20); in another, normal pregnancy and lactation took place despite incomplete recovery and subsequent fluctuations in weight (Case 3).

We may conclude, therefore, that from our clinical survey there is no evidence for any permanent damage to the endocrine organs; on the contrary, normal function may be resumed despite prolonged malnutrition.

(2) HEREDITY

Cobb (1943), placed anorexia nervosa "just below the psychoses" in severity of disturbance. Nicolle (1938), considered it to be a "pre-psychotic condition". Scott (1948), allied it with manic-depressive illness. It seems relevant, therefore, to examine the family histories of our patients for psychosis. Owing to the relatively small numbers, and the incompleteness of the family trees, affective disorder among the parents will alone be considered. If anorexia nervosa is genetically linked to affective disorder, it might be predicted that four or five parents with manic-depressive psychosis would be found among the families of our 38 patients (Stenstedt, 1952). In fact, only one parent (Case 14) suffered from a recurrent affective psychosis. No definite manic-depressives were found by Nemiah (1950), among the parents of his 14 cases. These findings do not support the hypothesis that anorexia nervosa, regarded as an entity, is genetically akin to manic-depressive illness. In the single case, however, heredity probably was important; two maternal relatives as well as the mother, were psychotic, and the patient's illness began with a suicidal attempt, followed by apathy and inertia occurring intermittently over several years.

In only 5 cases (Cases 6, 8, 13, 31, 38) were any siblings reported to be psychologically disturbed, and none were psychotic. However, of the 76 parents, 26 were psychiatrically disturbed, but not psychotic. Further discussion will be devoted to these figures in a later section.

(3) CHILDHOOD ENVIRONMENTS

In this and the next section, reference will be made to previous studies of groups of neurotic patients. Slater (1943), published a statistical study of 2,000 neurotic soldiers, whose average age was 28·3 years; the diagnoses in four-fifths of his material were: Anxiety Neurosis, Hysteria, Psychopathic Personality, or Reactive Depression. Mayer-Gross *et al.* (1949), reported the findings in a group of 201 neurotic officers, whose average age was 31·9 years, and whose intelligence probably approximated more closely to that found in our patients; there was also a control group of 55 officers. Linford Rees (1949), examined 2,000 neurotic W.A.S. personnel, whose sex, age and school records approach those of our group. Finally, a group of 63 patients suffering from anxiety states was investigated in the U.S.A. by Miles, Barrabee and Finesinger (1951), who provide evidence on features of prognostic importance. Our object has been to ascertain to what extent our patients conformed with the description given by these authors of the "neurotic constitution", viz. family history of neurosis, childhood neurotic traits, previous psychiatric illness, and abnormal personality structure. Controls studied by Mayer-Gross *et al.* (1949) and by Slater and Woodside (1951), showed significantly fewer of these neurotic pointers. The neurotic groups, taken together, are compared with our own in these, and in certain other respects referred to in the text (Tables I-IV). Where the figures for any one item differ significantly (χ^2 method), they are printed in heavy type. For obvious reasons, great caution must be used in interpreting the results.

(a) *Social and Economic Status of the Families*

The occupations of the fathers show that the patients were drawn from all social classes. Only one patient was brought up in an environment where "promiscuity, social chaos and economic insecurity" reigned (Case 31). The early death of the fathers raised economic problems for several families; 7 others were financially insecure for other reasons (Cases 6, 7, 16, 26, 29, 31, 38). One patient actually attributed her early feeding difficulties to economic causes (Case 7); "Father was wasteful and the family poor, so I stopped eating". This patient also had a strong sense of rejection by her parents. On the other hand, 11 families were economically secure, and enjoyed an average or good social position. These families were often described as "united". Four more families remained integrated despite overt or implied causes of family stress or strained relationships (Cases 5, 13, 32, 36).

(b) *Broken Homes; Parental Deprivation; Illegitimacy*

Eight patients, i.e. 22 per cent. (Cases 3, 6, 10, 14, 23, 24, 26, 37) had suffered the death or loss of a parent before the age of 14 years; two had lost their mothers, and six their fathers. Case 25 was cared for in her first year of life by an aunt during her mother's illness. Four patients (Cases 1, 7, 25, 38) lost a parent during adolescence. Three patients were illegitimate, and 2 were brought up in an orphanage. These numbers do not differ significantly from those found in other neurotic groups, and among non-psychiatric patients (Slater and Woodside, 1952; Barry, 1939). There were 9 instances of "broken homes" (24 per cent.) i.e. where for one reason or another the patient had had no settled or continuous home life during childhood (Cases 3, 6, 7, 10, 14, 23, 26, 31, 38). According to Bowlby (1951), the incidence of "broken homes" in the general population, before the age of 16, may be from 11-15 per cent. The difference from our findings is not statistically significant. The results both of Nemiah

(1950), and ourselves, show that in about one-quarter of the families the father was lacking, either through death or voluntary absence, before the patient reached 16 years of age.

(c) *Parental Age, Health, Personality*

The mean age of the mother at the patients' births was 29·5 years, ranging from 19 (Case 13) to 45 years (Case 22): five mothers were below the age of 25, and only one over 35. Thus, youthfulness or advanced age among the mothers, such as might perhaps have contributed to early feeding difficulties, appears unimportant. The ages of the fathers did not deviate from the normal range. There was considerable physical ill-health and mortality. Twelve patients (32 per cent.) had already lost a parent through illness, when they themselves fell ill. Six mothers and four fathers suffered from some chronic disease, which in six cases was psychosomatic in nature, i.e. chronic gastric ulcer (2), rheumatism (2), colonic disorder, migraine, and asthma (2). Thus approximately two-thirds of the patients had experienced some fatal or chronic illness in the family.

It is likely that this parental ill-health evoked hypochondriacal attitudes (e.g. in cases of asthma or pulmonary tuberculosis), and preoccupations with diet (e.g. in colitis, or gastric ulcer) within the family circle. In addition, however, eight parents were either hypochondriacal, or poor eaters, or very concerned with diet despite the absence of physical disease. Thus some twenty of the patients were probably subjected to an emotional atmosphere of invalidism or hypochondriasis for varying durations, and at some period of their childhood and adolescence. Among the 76 parents, there were in all, 26 who were psychologically disturbed (but not psychotic) i.e. 34 per cent. This may be compared with the figure of 26·5 per cent. found by Miles, Barrabee and Finesinger (1951), among the parents of their patients suffering from anxiety states (Table II).

TABLE II

Percentages of parents with psychological disturbance: in this study, and in that of Miles et al. (1951) on 62 patients with anxiety states.

	Psychosis	"Neurosis"	"Marked instability"	Totals
79 parents (Miles *et al.*)	10	5	22	37
76 parents (this group)	3	30	4	37

The incidence of psychological disturbance is identical. The differences in the diagnostic sub-groups may be partly due to differences in the criteria used. Our definition of "neurosis" and "instability" is based on the descriptions given in the case histories. Most of the "neurotic" parents seem to have suffered from anxiety states, with or without somatic dysfunction. Only three (Cases 1, 26, 35) could be called "markedly unstable". Miles *et al.* do not give the criteria on which they distinguish "neurosis" from "marked instability", so that closer comparison is not possible. But Nemiah's (1950) paper also suggests that in the U.S.A. "instability" may be the commoner diagnosis.

Another way of stating the incidence of familial ill-health is to give the percentage of patients having disturbed relatives. In this series 66 per cent. had psychotic or neurotic parents, or neurotic siblings. In Table III, are given some equivalent findings from other reports. The figures indicate that the families of these patients are as much loaded with mental ill-health as the families of other groups of neurotic patients.

TABLE III

Incidence of various features associated with the "neurotic constitution" in this and in 3 mixed neurotic groups. Figures given in percentages. Heavy type shows that the differences between two groups are significant at the 1% level using X^2 *method.*

	Historical Data									
	Family History of "neurosis" or psychosis	Neurotic Traits in Childhood	Much physical illhealth in Childhood	School Record Poor	School Record Good	Intelligence Poor	Intelligence High	Work record poor	Previous psychiatric illness	"Unstable personality"
2,000 neurotic soldiers (Slater, 1943)	56	59	34	31	14	31	10	33	23	45
2,000 neurotic servicewomen (Linford Rees, 1949)	58	46	—	7	32	17	33	20	23	57
201 neurotic officers (Mayer-Gross *et al.*, 1949)	41	45	27	—	—	8	—	23	37	73
ALL neurotic groups	56	52	33	19	**23**	23	**21**	26	**23**	**52**
38 patients, anorexia nervosa (This study)	66	66	32	11	**42**	19*	**54***	27†	**50**	**76**

The personalities of the parents have attracted much attention. Cobb (1943) described the typical home situation as a "robust nagging mother and a passive father". The personalities of the parents of our patients were by no means homogeneous. The mothers were, more often than robust, fussy, nervous and over-anxious; only in five cases (Cases 22, 25, 27, 30, 34), does Cobb's description apply. The personalities of the fathers also varied. Six were described as kind, sensible, fair, calm and easy-going, cheerful, sweet-natured, thoughtful and intelligent. Four were irritable, quick-tempered, moody, emotionally cool or reserved. The dominance/passivity relationship between the parents cannot in every case be assessed from the data available. In Cobb's series of 14 cases, described in detail by Nemiah (1950), four families were apparently dominated by the mother, and in four others the father spent little time at home; in only one family was the father probably the dominant parent. In our series, the mother seems to have been the dominant figure in eight families, and the father in six. In nine other families, the mother was the sole parent, owing to the father's death when the patient was 14 or younger: all these mothers, except one (Case 7), were irritable or anxious. Taking our material together with Nemiah's there are 13 families (26 per cent.) where the father played little part, either because of his death, or voluntary absence from home.

The unsatisfactory state of personality study and of our knowledge of interpersonal relationships are well known. The attempt to establish specific traits in relation to particular disorders is by no means established. Many of our patients grew up in an unsatisfactory atmosphere of fussiness and anxiety, but this is also described in the parents of other groups studied in psychiatric clinics, e.g. asthmatics (Rogerson *et al.*, 1935). It cannot be considered to have any special significance for the development of anorexia nervosa.

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* data in 17 cases only. † data in 33 cases who had begun work.

(d) *Size and Composition of the Families*

There were 6 only children, seven families of 2, nine of 3 children; the largest contained 9, 10, and 12 children. Cobb (1950), found a surplus of sisters; in our group there were 102 siblings, 45 brothers and 38 sisters, and 19 whose sex was not recorded. Even if all the latter were sisters, χ^2 method shows that the sex distribution did not differ significantly from an expectation of 51 siblings of each sex. This is still true if the males, and the females over 30 years are excluded. Cobb (1950), also suggested that the patient's place in the family may be important. More patients than would be expected on a chance distribution occupied the second position, but his results are not significant statistically. In the present material, fewer patients than would be expected by chance were second children, and this is true when the males, and the females over the age of 30, are excluded. In neither case are the figures significant.

(e) *Family Inter-relationships*

The family inter-relationships and the attitudes found amongst patients with anorexia nervosa have been described by Nemiah (1950). Maternal over-solicitude, with excessive dependence on the part of the patient, was the typical finding. In this series, eight patients possessed over-solicitous mothers, and four more were "very attached" to their mothers (31 per cent.). On the other hand, the mother of five patients were strict disciplinarians, and in four other families there was overt hostility between mother and daughter. Thus a different relationship was present in 24 per cent. The relationship between patients and fathers also varied. Six fathers were lenient or kind and won their daughters' affections. Seven were cool or actively antagonistic. In some families both parents showed similar attitudes (e.g. Cases 17, 20, 21). In others opposite attitudes were expressed (e.g. Cases 9, 28). In all, 26 patients experienced an unhealthy emotional relationship with one or both parents (68 per cent.). In twelve, the relationship was seriously abnormal, i.e. there was outright intolerance or excessive dependence. Only four patients had a relationship with both parents which was specifically stated to be satisfactory (Cases 2, 4, 16, 28).

To summarize these findings concerning the family background of the patients, it can be seen that:

1. Psychosis in the family is rare.
2. Gross disturbance in social or economic circumstances occurs only in a small minority.
3. Loss or absence of the father before adolescence may be a significant feature in the histories of patients with anorexia nervosa.
4. Invalidism, hypochondriasis or pre-occupations with diet are found in about half the families.
5. Parental neurosis is as common as among the parents of other neurotic groups.
6. Stable personalities among parents and healthy parent-patient relationships are the exception.
7. The size and composition of the families, and the position of the patient in the family, cannot be shown to differ from the chance expectation.

(4) THE PERSONAL HISTORIES

(a) *Early Development*

In general, the patients developed normally; only one (Case 31) had always been retarded. Full information is lacking on such interesting questions as the infantile feeding methods, early difficulties of management, weight variations, etc. But seven cases are known to have had gastro-intestinal disturbances, or feeding problems at or before the age of three years (Cases 7, 11, 15, 16, 22, 25, 38). One of these remained underweight during the first year of life (Case 25), another developed severe constipation, diagnosed as "megacolon" at the age of three (Case 38). In Case 7, reluctance to eat normal quantities began at three years and has lasted throughout life, with exacerbations.

(b) *Neurotic Traits during Childhood* (*4-12*) *years*)

All the seven patients described above continued to show digestive disturbances during later childhood, e.g. constipation, bilious attacks, faddiness, Case 15 was sick at breakfast from the age of 7 to 12; she disliked eating because of a "high colour after meals". Case 7, at the age of 10, starved herself for 7 days to "save money"; for days on end she is said to have lived entirely on sweets (her sister owned a sweet shop). In 13 other patients gastro-intestinal symptoms, feeding problems or weight deviation was recorded. Three were plump children (Case 2 weighed 12 stone at 14 years). Case 21 was always thin and disliked fats. Case 26 had "never taken breakfast". Cases 6, 12, 17, had frequent bilious attacks. The remainder were pernickety feeders. Thus, even during childhood, about half the patients showed weight deviation, or a major or minor difficulty connected with eating or digestion, beginning in 7 patients before the age of 4. In fact, 6 patients (Cases 7, 11, 15, 25, 36 and 38) fell ill in adult life in a setting of abnormal eating habits established during childhood.

Thirteen of these 20 patients showed clear-cut neurotic behaviour in other fields, and 11 others also exhibited neurotic traits. In three of the remainder, data were lacking. Thus only 5 of the 38 patients developed normally emotionally and as to their eating habits, whereas 24 out of the 35 in whom information was adequate showed neurotic disturbances. The figures show that 14 of these 24 (58 per cent.) had feeding problems; these are, of course, common during childhood, and we think it likely that about the same incidence would be found in an unselected group.

Table III shows the incidence of childhood neurosis in this series, contrasted with that amongst the neurotic groups described by Slater (1943), Linford Rees (1949), and Mayer-Gross *et al.* (1949). Patients with constipation, bilious attacks or weight deviation only are excluded from our figures. At least as high a proportion of psychological disorder during childhood occurred among our patients as among other neurotic groups. More serious divergences, from normality affecting the whole personality of the child, were found in 40 per cent. (15 cases); the difference from the figure of 26 per cent. given by Slater (1943) is not statistically significant.

The number of neurotic traits per patient was 2·0. This may be related to the relatively poor prognosis, for Miles, Barrabee and Finesinger (1951) found that the number was highest (2·2 per patient) in a group of patients with the worst outcome, compared with an incidence of 1·3 among patients who recovered.

(c) *Physical Health during Childhood*

Slater and Woodside (1951), noted that physical ill-health in childhood, defined as "much minor illness", was associated with neurosis in adult life.

Table III shows our findings. Twelve patients (Cases 2, 5, 7, 9, 10, 12, 13, 15, 22, 23, 27, 35) were thought to have had more physical ill-health than might have been expected in the average child, but it was not always easy to distinguish genuine physical illness from neurotic disorders. Thus Case 9 had a "funny illness" aged 7, which interrupted schooling; Case 13 was "anaemic" and suffered from atypical chorea when aged 9. Cases 10 and 7 were "delicate". Two patients (Cases 5 and 23) suffered from asthma. Only two patients (Cases 12 and 22) had serious prolonged illnesses, in both cases the result of rheumatic carditis.

(d) *School and Work Records*

These are of interest, firstly because they give further information about the alleged ambitiousness and conscientiousness of anorexic patients (Dubois, 1949), and secondly, because poor records in these spheres have been correlated with neurotic personality (Slater, 1943).

At school 8 patients (21 per cent.) were conscientious or ambitious, whereas four had poor records (Cases 10, 26, 31, 37); 12 (34 per cent.) disliked school, and were solitary and unhappy there. Fifteen patients were academically successful (i.e. won scholarships or achieved higher education). Owing to their youth and sex, the work record of the patients is not easy to assess; four patients, for example, had not begun work. Of the remainder, nine showed evidence of maladjustment (26·5 per cent.). Twenty-three patients had quite satisfactory records, and of these, six were noted to be specially conscientious at work (18 per cent.).

Table III shows the school and work records of our patients and their intelligence as estimated during admission to hospital (the data on intelligence were available in 17 cases only). One quarter of the patients had a poor work record despite good intellectual ability as shown by school performance and by formal testing. To some patients work seemed necessary to achieve even a precarious adjustment. Case 7, for instance, said "If I did not work, I would be ill", and "If I am not working, what is the use of my eating?" This type of abnormal conscientiousness has been particularly noted in some cases of anorexia nervosa (Dubois, 1949).

The good intelligence of most patients with anorexia nervosa has also been observed elsewhere (Dubois, 1949) although the results of actual mental testing have not been recorded. The fact that one of our patients (Case 31) was a high-grade defective is therefore of special interest. Her expressed intention, like that of some more intelligent patients, was "not to become fat". But she never refused food. Instead she always vomited after eating.

(e) *Previous Neurotic Illness*

The high proportion of patients with childhood neurotic traits has already been noted. It is not surprising then that as many as 19 patients (50 per cent.), showed psychiatric symptoms after the age of 12, but before the onset of anorexia nervosa (Cases 6, 7, 8, 10, 11, 13, 14, 15, 17, 23, 25, 26, 27, 32, 33, 34, 35, 36, 38). Six patients suffered from "depression"; five from "tiredness" or "anaemia and debility"; four had vomiting attacks; three had a severe bowel neurosis; three frequency of micturition; three fainting fits, or overt hysterical attacks; two experienced a compulsion to check and two others had episodic obsessional illnesses with rituals; one patient, a boy, had a phobia of dirt; another had delinquent tendencies; one patient was alcoholic. In all these patients, the neurotic illness had interfered considerably with their lives, leading to interruption of school or work, attendance on doctors, or hospital treatment as out-patients. Six patients gave a history of "psychosomatic disorder" (asthma (2), vasomotor rhinorrhoea, colitis, functional megacolon and migraine). Previous attacks of anorexia nervosa, leading to in-patient hospital treatment, had occurred in eight cases (Nos. 2, 5, 10, 13, 17, 27, 29, 33), and varying degrees of recovery had taken place before admission to the Maudsley Hospital. Five of these patients had also shown some of the other neurotic symptoms described above.

(f) *Pre-morbid Personality Traits*

Some authors (Palmer and Jones, 1939; Rahman, Richardson and Ripley, 1939; Dubois, 1949), have described certain personality traits as characteristic of anorexia nervosa, and have spoken of a type similar to the "anal-erotic character of the Freudians". Obsessional traits are said to be outstanding. The patients are also said to be ambitious and intelligent, but insecure, seclusive, shy, dependent and immature. The findings in this material are shown in Table IV, and are compared with the traits found among neurotic patients in other reports.

TABLE IV

Incidence of various personality traits in this and in 3 mixed neurotic groups. Figures given in percentages. Heavy type shows that differences between the two groups are significant at the 1% level using χ^2 method.

	PERSONALITY TRAITS							
	Obsessional	Hypochondriacal	Anxiety-proneness	Hysterical	Dependence, timidity	Inertia, laziness	Food faddiness	"Stability"
2,000 neurotic soldiers (Slater, 1943)	20	7	24	14	33	24	—	55
2,000 neurotic servicewomen (Linford Rees, 1949)	29	23	68	32	36	20	—	43
201 neurotic officers (Mayer-Gross *et al.*, 1949)	37	—	59	—	53	—	—	—
ALL neurotic groups	**25**	**15**	**46**	23	35	22	—	**49**
38 patients, anorexia nervosa (This study)	**50**	**34**	**24**	24	48	13	32	**24**

In our material, obsessional traits were found in 50 per cent. This figure is not significantly different statistically from the 37 per cent. found by Mayer-Gross *et al.*, among neurotic officers. However, interference with efficiency or enjoyment of life was an important criterion used by these workers. Only 10 of our patients (26 per cent.) would fall into this category. It was, however, difficult to judge to what extent the obsessional traits described in the case records actually handicapped the patient in her daily life. The figure of 50 per cent. is significantly higher than that found by Linford Rees (1949) and by Slater (1943), among their total material. This fact may possibly be related to the higher average intelligence of our patients.

Obsessional personality traits are undoubtedly often present in patients with anorexia nervosa, but they are certainly not an essential part of the syndrome. Some of our patients showed no obsessional traits, e.g. Case 3, who described herself as "the reverse" of obsessional. Probably the obsessional habits indicate only in a general way a severely neurotic personality, and are not specifically significant for the development of anorexia nervosa. Linford Rees (1953), for example, found obsessional traits among 40 per cent. of his female asthmatics in a similar age group.

It may be seen from Table IV, that there is a higher incidence of hypochondriacal traits, including food and bowel pre-occupations, and a lower rate of anxiety proneness in our group than in the other reports. Forty-five per cent. were "outgoing or sociable", and approximately the same proportion were "shy and reserved". Only 24 per cent. could be regarded as "stable", assuming rather wide limits of normality. Thus the group as a whole show poorly integrated personalities, manifesting the traits usually associated with emotional instability.

(g) *Physique, Menstruation and Endocrine Status*

The usual weights of patients who develop anorexia nervosa are of interest, because they may indicate earlier attitudes towards eating. Ten (26 per cent.) of our patients are known to have been overweight during infancy (1), childhood (2), or adolescence (10), and two had been overweight as adults. Five patients were "thin" at some period before maturity. These figures may be underestimations because systematic data were not available. Variations in weight are, of course, common, particularly during adolescence, and it is not known if a higher proportion of our patients showed weight deviations than might be found in a random sample of the general population. These variations in weight could also indicate endocrine or hypothalamic disturbance. One patient (Case 22), after a head-injury which resulted in two days' loss of consciousness, steadily gained weight to 12½ stone over a six-year period. This is the only case in which possible physical trauma to the midbrain or hypothalamus could have been related to the change in weight. At a later date she lost 42 lb. rapidly when her husband went abroad. She showed no other evidence of hypothalamic disorder.

Sheldon (1937) considered that the heights of some of his own and of reported cases indicated pituitary deficiency. The average height of 17 of these patients (excluding the four males) was 5 ft. 3 in. (highest 5 ft. 7½ in., lowest 4 ft. 9½ in.). Only two patients were under 5 ft. and three over 5 ft. 6 in. An adult male was 5 ft. 8 in., but a boy aged 13 was only 4 ft. 4½ in. These findings do not suggest endocrine disorders, such as hypogonadism or pan-hypopituitarism, except in the case of the boy. He had a four years' history of repugnance for food, associated with a severe phobic state, so that there were prominent psychological abnormalities resulting in under-nutrition which could account for his failure to develop. Cases of this kind have been described by Decourt (1947), Hubble (1952) and by Talbot *et al.* (1947).

Constitutional hypogonadism as a background for the disorder has been suggested by Aub (1945), Nicolle (1939), and Rahman *et al.* (1939). The premorbid menstrual functions of our patients do not support this theory. As reported elsewhere (Kay, 1953), the menarche occurred during the normal age-period (11-15) except in four patients in whom it was retarded by 1-4 years. Common minor irregularities such as dysmenorrhoea, rather scanty loss, and/or irregularity, were reported at some stage in 16 patients; menorrhagia was noted in three patients. On the other hand, menstruation was eventually established, with regular periodicity and normal loss, in all but 10 out of the 28 women in whom information was available. The illness in fact usually interrupted normal menstrual function, a fact noted by other observers (Decourt and Michard, 1950). The hair growth and secondary sex characters were usually normal, except for the downy hair on the limbs which also occurs during famine. Three patients showed a masculine distribution of hair. The breasts were underdeveloped in four, whereas in seven they were specially observed not to share in the general wasting, a well-recognized occurrence (Farquharson and Hyland, 1938). Of the four males, a man of 45 (Case 18) had suffered traumatic castration of both testicles twenty years previously. His present illness—loss of weight and appetite, with hypochondriasis centred on peculiar abdominal sensations—had lasted 2½ years. He committed suicide after leaving hospital. Despite the castration, it seems probable that this illness which occurred so long afterwards, was psychologically determined. Hemphill (1944) however, published a remarkable case of a man with obsessional neurosis, anorexia, loss of weight, and hypogonadism, who was cured by leucotomy.

It appears that constitutional or acquired endocrine abnormalities are inessential to the disorder, and that in the great majority of cases, it is unnecessary to assume that they exist. The problems of the amenorrhoea, and of possible endocrine changes secondary to prolonged undernutrition, are discussed later.

(h) *Sexual Adjustment*

Of the four women (Cases 6, 9, 12, 17) who were married at the time of admission, three were known to be sexually frigid. Two had fallen ill shortly after marriage. Only one of the married patients, and one other, a widow (Case 14), had children. The male patient already described (Case 18) who had suffered traumatic castration 17 years before the onset of his illness, had subsequently married. Sexual intercourse was said still to occur, but infrequently. Of the 25 unmarried adults (i.e. aged 18 or more) fourteen showed evidence of psycho-sexual maladjustment, most often indifference to or dislike of male attention. Two adolescents also had serious sexual difficulties (Cases 16, 34). Several patients said they wanted to remain slim, boyish or athletic, and some of these were particularly concerned by mammary development.

SUMMARY

The personal histories of the patients show that:

(1) In respect to childhood neurotic traits and physical ill-health, they conform with mixed neurotic groups previously described. Two-thirds showed neurotic disturbance, and about half had some feeding or digestive difficulty in childhood. Minor physical ill-health occurred in one-third.

(2) The incidence of previous neurotic illness, and poor personality development is higher than described in the mixed groups. Obsessional and hypochondriacal traits are more, and anxiety-proneness less common.

(3) More patients are of above average intelligence than among the other groups. Despite this, one-third were unhappy at school. The work-record was satisfactory in the majority, but less than a third were exceptionally conscientious at school or work.

(4) Sexual maladjustment is the rule.

(5) The physique (heights and weights), menstrual histories, and endocrine states, did not vary outside normal limits.

(5) MALE CASES

Recently American psychiatrists have tended to exclude males altogether from their reports (Nemiah, 1950), presumably owing to current psychopathological theories. Cobb (1950), by making amenorrhoea one of the criteria for diagnosis, has also excluded males. When the cases are unselected however, males form from 10-30 per cent. of cases, Ryle, 1936; Farquharson and Hyland, 1938; Berkman, 1939. Detailed reports, especially of the psychiatric features, have seldom been given, but there are descriptions by Venables (1930), Langdon-Brown (1934), and Morlock (1939). Included in the present series are three men and one boy, whose histories are given in the appendix.

There is no doubt, from a study of these cases, that severe under-nutrition due to repugnance for food, or morbid ideas about the effects of eating, but without psychosis, can occur in males. As in the female cases, the condition may remit either spontaneously, or with supervised dietary, or psychological treatment. Endocrinotherapy is unnecessary. The published reports show some differences in the clinical picture of these male patients. Fear of becoming fat is not expressed, and hysterical "belle indifference" and apparent self-satisfaction is uncommon. On the other hand, hypochondriacal anxieties or pre-occupations are more often found, e.g. that "too much" food, or certain foods, cause weakness, seminal emissions, or stoppage of the bowels.

Few follow-up studies have been reported on males with anorexia nervosa. Cobb (1950), states that males with this syndrome "nearly always become schizophrenic". The patients reported by Venables (1930), Farquharson and Hyland (1938), McCullagh and Tupper (1940), and Sexton (1950), 6 cases in all, were not psychotic after periods varying from 7 months to 8 years.

The follow-up of the males in this material is, unfortunately, incomplete. Case 10 is untraced. Case 11 is known to be alive and able to work at the age of 28; his father states that he is "clever in some ways, but lacks every-day judgment"; no details are available. Case 36 developed pulmonary tuberculosis; he gained weight in a sanatorium, but two years after the original admission he was still dependent and inadequate, with a morbid interest in his diet.

Attempts to explain the higher incidence in women include the following theories:

(1) In general, the bodily contours have a greater significance for maturity, especially sexual maturity; by keeping thin, female patients deny adult sexuality and responsibilities.

(2) More specifically by hysterical and phobic mechanisms, they may make use of the common equation of pregnancy with growing fat; presumably, the unconscious fear of pregnancy which results in refusal to eat does not occur among men.

When the disorder is an expression of bowel hypochondriasis, an obsessive-compulsive state, or a predominantly depressive illness, it occurs in both sexes. Neurotic pre-disposition or abnormal personality structure are nearly always found.

(6) TREATMENT AND OUTCOME

The immediate results of hospital treatment and the long-term outcome have been described elsewhere (Kay, 1953). The time-honoured treatment, by persuasion and meticulous supervision of the patient's diet, practised so successfully by earlier physicians (Ross, 1936; Hurst, 1936), has in recent reports been found less satisfactory. Deeper psychotherapy, extending to "total personality adjustment", and follow-up support, over several years, is now advised in order to lessen the chances of relapse and to assist the patient with her neurotic problems (Dubois, 1949). The results of hospital therapy in our cases confirm the difficulties of treatment. Only about half the patients gained 14 lb. or more in weight during an average stay of 3 months. In addition to the orthodox methods, deep psychotherapy ("insight" therapy; analysis) was attempted in nine, and modern physical methods (E.C.T.; leucotomy) were employed in five patients. The results were not uniformly successful. Three patients broke off psychotherapy, and must be considered failures of this mode of treatment; one patient died, and only one recovered during therapy. The psychotherapist has often to contend with a patient who does not admit that she is ill, or is negativistic and hostile. We are inclined to believe that psychotherapy is not the treatment of choice, unless (1) there is no urgency; (2) a good relationship can be quickly established; (3) the patient is able to formulate a complaint which can be used as a basis for therapy.

In patients who are cachectic and resist supervised feeding, physical methods should be considered. Several authors (Hemphill, 1944; Sargant, 1951) have reported good results with leucotomy. The indications appear to be: cachexia, associated with severe tension, phobic, or obsessional states, which has not responded to other methods. In our material, Case 27 was treated by leucotomy in another hospital, after 15 months' unavailing analysis she was relieved of a severe compulsion neurosis and, 18 months after the operation, weighed 10 stone 10 lb. In these young patients however, leucotomy cannot be undertaken without most careful consideration. Sifneos (1952), and Carmody and Vibber (1952), reported striking improvements in two patients after modified (lower quadrant) leucotomies; probably restricted operations should always be done in the first instance. There may also be a place for the wider use of E.C.T. Its action on psychological disorders may be unspecific (Roth, 1952). A patient under the care of one of us gained 14 lb. with this treatment, after two months' intensive psychotherapy had failed to produce the slightest improvement. In very longstanding cases, who maintain their weights above a cachectic level, determined attempts at re-alimentation are best avoided. Supervised feeding, particularly tube-feeding, may cause vomiting and strong emotional reactions with much resentment. Therapy, if it can be undertaken at all, should be supportive, and restricted to current problems.

Finally, endocrine therapy has no place in the treatment of the acute phase, either for the anorexia or the amenorrhoea. Thyroid is contra-indicated if the patient is not eating, and unnecessary if she is. Pituitary and ovarian hormones seldom cause menstrual bleeding; if they do, the patient may react with an exacerbation of symptoms, vomiting and abdominal pains (Cases 19, 25). Moulton (1942), studied the vaginal smears of a patient with cyclical vomiting. She found that the vomiting was associated with increased vaginal cornification, which indicated oestrogenic activity. If the patient reacts to her own oestrogens by vomiting, there is nothing to be gained by prescribing them. Only if normal weight has been regained, and the patient is psychologically ready for menstruation, may endocrine preparations be given with benefit; perhaps an endocrine "boost" is necessary after prolonged amenorrhoea to induce a second "menarche" in the life of the patient.

OUTCOME

The frequency of relapse and of partial recoveries is well known. Our follow-up study (Kay, 1953) confirms that menstrual irregularities (45 per cent.) and disturbance of appetite (65 per cent.) with low or fluctuating weight (50 per cent.) were often to be found after periods varying from 2 to 19 years. This tendency of acquired patterns of behaviour to persist may be fundamental for the understanding of mental ill-health. It occurs in other psychiatric syndromes; for instance, Wheeler *et al.* (1950), traced 173 patients who had been diagnosed as suffering from "Effort syndrome" 20 years earlier. No fewer than 52 per cent. still had some disability from mental or somatic symptoms attributable to anxiety. Patterns of reaction, psychological and psychosomatic, once established, are not readily disturbed.

In addition, our patients showed a variety of neurotic symptomatology. Sexual adjustment in particular was seldom achieved. Seven patients married, and of these 5 had children (Cases 2, 3, 5, 15, 20); but sexual frigidity was reported in all five who gave information on this topic. This accords with the finding of Miles *et al.* (1951), that sexual adjustment among neurotic patients is unlikely to improve. Many patients were found to be suffering from depressive spells, headaches, panic attacks, hypochondriasis, or difficulties at work and in inter-personal relations. The original case-records showed that these symptoms had usually formed part of the clinical picture on admission to hospital, but were overshadowed by the feeding problem.

Only Case 24 developed new, schizophrenic symptoms, i.e. episodic auditory hallucinations and passivity feelings. During her treatment for anorexia nervosa she had, however, already shown a psychotic reaction, consisting of florid paranoid delusions in a setting of severe depression. It is of interest that her psychosis was atypical, responding promptly to E.C.T., and that now, 9 years after the beginning of her illness, she is married and living at home. Cobb (1950), also found that psychotic episodes occurred, but were not typically schizophrenic.

Summary and Conclusions

1. The family histories, childhood environment, and previous mental health of 38 patients with the syndrome known as "anorexia nervosa" have been examined. They show that parental neurosis, disturbed parent-child relationships, childhood neurotic traits, and previous neurotic illness, are common. These are all features of the "neurotic constitution".
2. More specific findings are: parental invalidism, hypochondriasis and dietary preoccupations; and, among the patients, earlier feeding difficulties.
3. The personalities of the group are poorly-integrated and show a variety of neurotic traits. Obsessional traits occur in half, but their exact significance for anorexia nervosa is uncertain.
4. Intelligence is nearly always at least average.
5. There is no evidence for constitutional or acquired endocrine disorder in the premorbid clinical picture. The illness itself is explicable without assuming endocrine changes, except for (*i*) compensatory adjustment to undernutrition, (*ii*) a specific mechanism causing the amenorrhoea, when this occurs early. This mechanism probably also causes the amenorrhoea which may accompany other psychic disturbances not specially associated with anorexia or loss of weight. Endocrine therapy seldom, if ever, materially affects the course of illness.
6. The psychiatric symptomatology is diverse. There is no neurosis specific to anorexia nervosa, and no specific anorexia nervosa. We are not convinced that we have been dealing with a psychiatric entity.
7. The prognostic survey shows that the definitive symptoms persist in about half the cases, and that residual neurotic symptoms are the rule. Fifteen per cent. die from the illness or its complications.
8. Treatment is unsatisfactory. A plea is made for a broader and more flexible approach to this problem.

APPENDIX

Four Male Cases

Case 10

Single male, aet. 25, admission 10.ii.37. Six months' tiredness, insomnia, anorexia.

Attitude to illness: Brooding, anxious, better with fiancee.

Other symptoms: Morning depression, irritability, avoidance of company, needle-like chest pains.

Family history: Illegitimate. M. alcoholic; one brother healthy.

Personal history: Orphanage till 4. Neurotic child. Backward scholar.

Interests: Astrology and fortune-telling.

Occupation: Butler (three posts).

Sex: Engaged 12 months. Keen on girls.

Personality: Secretive, pessimistic, over-conscientious. Afraid of being alone, cries when upset.

Health: Three previous similar attacks, aet. 15, 18 and 20. Active P.T. diagnosed once.

On admission: Weight: 8 st. 3 lb., estimated loss 2 st. Marked wasting; general weakness; cold extremities; dyspnoea on exertion; normal secondary sex characters.

Mentally: Cause of illness "too little fresh air, not eating, self-neglect". Mood mildly depressed. No delusions, hallucinations or obsessions. Shy about sex.

Spec. invest.: X-ray chest, "healing and partly calcified focus R apex". Other tests including E.S.R. and Sputum, neg.

Treatment: Bed rest, high calorie, mod. insulin, inj. Ant. Pituitrin.

Course: Moody, querulous, but at times cheerful. *Behaviour:* Defiant, interfering. Took fluid diet under protest. Discharged to convalescence "Mentally improved, physically unchanged". (Weight: 8 st.)

Diagnosis: "Anorexia nervosa, with severe neurasthenia".

Follow-up: Untraced.

Comment: Because of inadequate data about attitude and response to feeding, case must be considered doubtful.

CASE 11

Boy aet. 13, admission 27.iv.37. Four years' disinclination to eat, nausea and constipation, and failure to grow. Physical examinations negative. Fifteen months' psychotherapy before admission, without benefit.

Family history: Mother neurotic, has digestive troubles. Two healthy younger brothers.

Personal history: Feeding difficulties in infancy and childhood (humanized milk till four or five years old). Succession of nurses. Neurotic traits, Boarding schools 6½-12; unhappy. Musical, artistic, precocious.

Personality: Sensitive. Fearful of being disliked, always questioned things; afraid to do things alone. Meticulous and tidy; lazy.

Health: Jaundice aet. 10. Obsessional fears of dirt.

On admission: Weight: 3 st. 8 lb. 4 oz., Height: 4 ft. 4½ in. Marasmic.

Mentally: Believes enjoying food to be wrong; food "harmful, blocks bowels". Weeps if pressed to eat. Regards ideas as unreasonable, but they have near-delusional force. Abnormally quiet and contented.

Spec. invest.: Physical neg. I.Q. (Cattell Test, scale 3) 140, (Kohs blocks) 117.

Treatment: High caloric diet. Ant. Pituitrin 1 c.c. daily. Psychotherapy three times weekly.

Course: Hides and disposes of food. Unable to swallow stomach tube. No improvement.

Diagnosis: "Anorexia nervosa associated with pituitary disorder".

Follow-up: Aet. 28, working. Said to be "Clever at some things, but to lack everyday judgment". No further details.

Comment: A severely disturbed child with obsessional and phobic symptoms relating to eating and digestion. Similarities to cases 18 and 31 among the female cases. Marked stunting of growth. Endocrine status uncertain.

CASE 18

Married man, aet. 45. Admission 12.x.38. Two-three years' unpleasant abdominal sensations, anorexia, loss of weight. *Course:* no work two years; became depressed.

Family history: Negative.

Personal history: Normal child; average scholar. Served, Army 1914-19; good record.

Sex: Married 1919. S.I. infrequent.

Personality: Jolly, never worries.

Health: Traumatic castration 1919. 60 per cent. pension. Subsequently felt exhausted and had to rest three months every year; no depression.

On admission: 3 stone below normal weight. Bilateral scars and absence of testes. Chronic constipation. Hysterical tenderness of abdomen.

Mentally: Mildly depressed; entirely preoccupied with his "indescribable" abdominal sensations; unoccupied. No delusions or hallucinations. Great desire for cure expressed.

Spec. invest.: Routine neg. No hormone assays.

Course: Took diet with persuasion. Importunate to have sensations relieved. Discharged National Emergency, unchanged.

Clinical Conference: "No organic basis, no psychosis; condition most nearly resembles anorexia nervosa. Diagnosis: ? Anorexia nervosa.

Follow-up: Found drowned two days after leaving hospital.

Comment: Hypochondriacal preoccupations main feature; attitude to food not fully described. Atypical case, ? endocrine factor.

CASE 36

Single male, aet. 21. Admission 17.iv.50. Six years anorexia, loss of weight, tiredness, headache, giddiness.

Attitude to illness: Believes certain foods are responsible.

Other symptoms: Inferiority feelings, depression, suicidal thoughts.

Family history: F. neurotic, little feeling for patient. M. too protective. Only child.

Personal history: Fearful, timid child.

Interests: Reading.

Occupation: Assistant librarian.

Sex: Guilt over masturbation. Has had two girl friends.

Personality: Hypochondriacal, many food fads, vegetarian. Poor mixer.

Health: Symptoms continuous since aet. 15. Developed P.T. aet, 22.

On admission: Weight, 8 st. 6 lb. Height, 5 ft. 8 in. Marked wasting. Cold extremities.

Mentally: Cause of illness: Dietary: certain foods affect his body in certain ways. Depressed. No delusions, hallucinations or obsessions.

Spec. invest.: X-ray chest 1952—active pulmonary tubercle. Sputum negative. E.E.G. abnormal.

Treatment: 8 E.C.T.—40 psycho-therapeutic interviews.

Course: Improvement. Follow-up in 1953—symptoms free—10 stone.

Diagnosis: Anorexia nervosa.

Follow-up: As above.

Comment: Three psychiatrists independently diagnosed him as suffering from anorexia nervosa.

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BODY-SWAY SUGGESTIBILITY AND NEUROSIS

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I—The Problem

In 1947 H. J. Eysenck published evidence which led him to the conclusion that neurotics as a group were more suggestible than normal individuals. Suggestibility was measured by means of the Body-sway test, a modification of Hull's method (1933). The distributions of 900 male and 330 female neurotics on this variable were clearly different from that of the control group of 120 normals. For example about 17 per cent. of the male neurotics and about 14 per cent. of the females fell outright, an event which was never observed in the normals. The distributions for the male neurotics and normals are shown in Table I. When the patients were graded according to the degree of "neuroticism", they showed, there was a continual increase in average suggestibility scores from the normals (with a mean score of 1·02 in the males) through five grades of severity of illness to the most neurotic (with a mean score of 5·55 in the males). Eysenck concluded that "suggestibility is closely related to neuroticism". (1947, p. 189.)

Table I*

Percentage distributions of sway with suggestion†

	0	1	2	3	4	5	6	7	8	9	Fell
Normals (120) ..	29	50	10	5	3	1	1	1			
Neurotics (900) ..	8	18	20	12	10	6	4	3	1	1	17

An examination of Eysenck's method of measuring body-sway led the present writer to believe that an alternative interpretation of the findings might be given. Suggestibility was defined as the maximum displacement from the vertical position (either backwards or forwards) during a 2½ minute period in which suggestions of falling forward were given by means of a gramophone record. The direction of sway was not taken into account, as there was a tendency for the most negatively suggestible to show more neurotic symptoms as well as those who swayed forward. It is clear that this displacement can be divided into two components, one due to the effect of suggestion and the other resulting from the sway which is always present in standing with the eyes closed (static ataxia).‡ The two components are not necessarily independent. It seems that Eysenck's observations could have resulted from the fact that the neurotics showed greater static ataxia than the normals, in which case the effect of suggestion could have been the same for the two groups.

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* Adapted from *Dimensions of Personality*, p. 184.

† All results in this paper are expressed in inches.

‡ This term when used in a clinical sense refers to an abnormal amount of swaying. It has now become customary to use it to designate sway as a variable present in all individuals to some degree.

TABLE II

*Percentage distributions of static ataxia (inches)**

	0–1	1–2	2–3	3–4	4–6	6+
Normals (120)	82	18				
Neurotics (900)	27	38	14	6	7	7

Eysenck did in fact measure the static ataxia of his subjects during 30 seconds before giving the suggestions, defining it as the maximum displacement forward plus the maximum displacement backward. His results are shown in Table II. It is at once apparent, as he pointed out, that neurotics are differentiated from normals with respect to static ataxia. This variable seems to give at least as good a differentiation between the two groups as suggestibility, defined as described above, in spite of the fact that its measurement takes only one-fifth of the time. This fact shows that the interpretation suggested is, at least, plausible.

Recently, Eysenck (1952) has reported more findings which are in the same direction as the earlier results. With respect to suggestibility, however, the later figures do not show such a clear differentiation between neurotics and normals as was found previously. Clarke (1950) and Gravely (1950)† found that neurotics and normals did not differ significantly with respect to suggestibility, although there was a small difference in the predicted direction. Investigations by Furneaux (1952) and by Himmelweit, Desai and Petrie (1946) have supported the hypothesis that there is a difference in suggestibility between the two groups. The difference in static ataxia between neurotics and normals has been confirmed by several workers and can probably be accepted as an established fact.‡

In all those cases where a difference in suggestibility was found, it could have been accounted for by the difference in static ataxia. The object of the present investigation was to determine whether the difference in performance between neurotics and normals on the Body-sway test could be accounted for in this way or whether neurotics did in fact respond more to suggestion.

II—METHOD

(i) *General Outline*

The design of the investigation was determined largely by the fact that it was possible to measure static ataxia independently of response to suggestion, using the Body-sway test, but not *vice versa*. The test was given twice to each subject. On the first occasion, the suggestion was omitted. During the $2\frac{1}{2}$ minute period when the suggestion is usually administered, static ataxia was measured as the sum of the maximum displacements forward and backward. After a rest period the test was given in the ordinary way with suggestion. A group of normals and another of neurotics were tested in this way.

(ii) *Apparatus*§

The apparatus (see Fig. 1) for measuring body-sway consisted of a movable scale (A) mounted on a board (C). A cotton thread, attached to the subject's coat by means of a paper clip, passed through three guide rings (D) fixed to the scale, over a screw (E) to a weight (K) of 14·5 gms. which served to keep the thread taut. The scale was graduated in quarter inch units, as shown, from a central zero point in line with the central guide ring. An arbitrary point (G) was marked on the thread and the maximum sway in either direction was recorded by means of riders (H) comprising small brass nuts (6 B.A. Hexagon). Preliminary trials showed that the riders maintained a constant position on the thread except when they came into contact with the central guide ring which was too small to allow them to pass.

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* Adapted from *Dimensions of Personality*, p. 276.

† Although described in separate theses, the authors explain that the work was done jointly. Each thesis contains a full account.

‡ Hildebrand has recently failed to find a significant difference in static ataxia but he used a measuring device which differed in many respects from those of other workers.

§ This apparatus is similar in certain respects to one designed by A. Heron (1951).

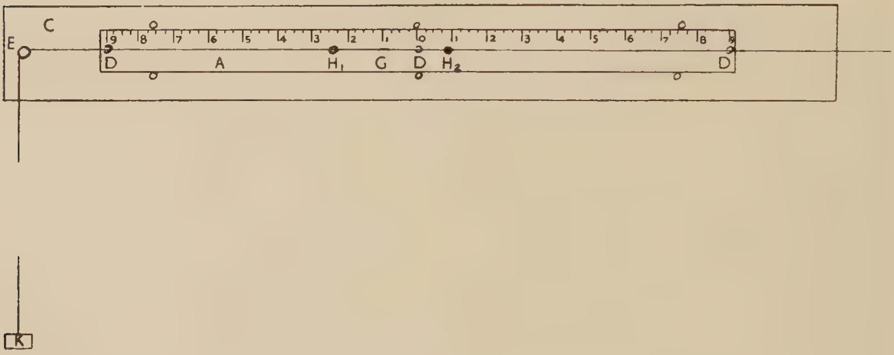

FIG. 1

The apparatus was mounted horizontally at a height of 5 feet from the ground. The distance between the wall and the nearest point of the apparatus (I) was about 6½ feet. Two pieces of equipment were constructed, each according to the above specification, and checked to make sure that they gave identical readings. One of these devices was mounted permanently in the room where all the patients were examined and the other was fixed to a portable stand. The latter was used for testing the normals, and was erected in a room which was made available at their place of employment.

The record used for administering the verbal suggestions, was one made by H. J. Eysenck for another investigation. Included on the record were the preliminary instructions: "Just keep standing quite still and relaxed please, with your eyes closed, and listen to me. Now I want you to imagine you're falling forward, you're falling, falling forward, you're falling forward all the time . . ." For convenience, the record was reproduced on a tape recorder, which was placed on a table in front of the subject and to his right.

(iii) *Test Procedure**

It was necessary to ensure that the subjects were unaware, during the test without suggestion, of what was to follow in the test with suggestion. This was to eliminate, as far as possible, any introduction of auto-suggestion by the subject. An attempt was made to test all the patients within a few minutes of admission to hospital, to prevent other patients from giving them information about the tests. Similar precautions were taken in the case of the normals by ensuring that none of them were told, before the investigation started, exactly what the tests involved. The only information they were given was that they would have to stand still for a few minutes with the eyes closed. Each normal subject was asked to co-operate by not disclosing any more information to the rest of the group. It was not anticipated that these measures would be entirely successful and a further check was introduced by questioning after the tests. When there was reasonable suspicion that a subject knew, during the initial test, about the verbal suggestion that was to follow, or was thinking about falling, he was excluded from the group. The precise criteria for exclusion are stated below. Before the test was given, the subject's height was measured and recorded, together with his own estimate of his weight. He was then asked to stand facing the wall, approximately half way between it and the measuring apparatus, with his feet together, his arms hanging loosely at his sides and his eyes closed. After checking to make sure that his heels and toes were together and that his eyes were closed, the paper clip was attached to his coat collar, roughly in line with the back seam.

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* An attempt was made to adhere as closely as possible to the procedure outlined by Eysenck (1947).

The sliding scale (A) was then adjusted until the central guide ring (D) was in about the same position as the ink mark (G) on the thread. This defined an arbitrary zero point somewhere within the range of movement of the ink mark. The riders (H) were then placed close to the central guide ring (D) and the stop watch was started as soon as they were in position. After thirty seconds the distance H_1G (=F) and H_2G (=B) were measured to the nearest quarter inch. When these observations had been recorded, the riders were returned to their positions close to the central guide ring. The experimenter stood in front of the subject and said "Just carry on standing there with your eyes closed." From this point a further period of $2\frac{1}{2}$ minutes was allowed to elapse before further measurements of F and B were made and recorded. As far as possible, the same section of the scale was used for both measurements of one test but variations did occur from test to test. After the test the subjects were asked how they felt and whether they had been thinking about falling.

They were then allowed to rest for a period of fifteen minutes from the end of the first test to the beginning of the second. During the rest period, the patients were in the same room with the experimenter but the normal subjects were in an adjoining room with an assistant. In both cases, illustrated magazines were available for those who wished to read them.

The second test, with suggestion, was administered in precisely the same way, with the addition of the record during the $2\frac{1}{2}$ minute period. After recording the measurements at the end of the 30 second period and re-setting the riders, the experimenter stood in front of the subject and said "I am going to play a record to you now. I want you to listen carefully to what the record says, while you go on just standing there, quite still and relaxed, with your eyes closed. Listen carefully and just keep on standing as you are standing now. I am putting the record on now." The stop-watch was started as the first word of the record was spoken, and the voice was faded out rapidly at the end of exactly $2\frac{1}{2}$ minutes.

When a fall occurred, the stop-watch was stopped immediately and the subject was caught by the experimenter. The latter stood sufficiently far from the subject to ensure that no recovery of balance would have been possible without the subject's either moving his feet or putting his hand against the wall, had the experimenter not held him upright. In some cases, the subject did move his feet or put out his hand to recover his balance before coming into contact with the experimenter. In these cases falls were recorded as occurring at the times when these movements took place.

After F and B had been recorded as before, the subject was allowed to sit down. Further questions were asked mainly in an attempt to discover any subject who had had prior knowledge of the test procedure.

III—SUBJECTS

Except for a few unavoidable omissions, all patients admitted to the neurosis centre of Whitchurch Hospital during the period of the investigation were tested. They were all male and over twenty years of age.

The normal group was comprised of employees of the Inland Revenue Department, Llanishen, Cardiff. A complete alphabetical index of staff was available, divided into two sections, established and temporary, in the ratio of approximately two to one. From the established personnel, the first two people from each letter of the alphabet were selected, and from the temporary staff the first one. Only people born between 1906 and 1932 were included. Anyone falling outside this range was replaced by the next person in the alphabetical list. Although the selected group contained both sexes, it was later decided to test only the men, who comprised about 60 per cent. of the group. Two of these refused to take part in the investigation.

The following subjects were excluded:

(*a*) All patients who were over 45 years of age.
(*b*) Subjects for whom it had been impossible to follow the experimental procedure rigidly.
(*c*) Patients who had heard the record before being tested.
(*d*) After the first test the subjects were asked "What were you thinking about all the time?" Any whose answers included falling or overbalancing were excluded.
(*e*) Subjects who admitted on direct questioning to having known beforehand about the test procedure.
(*f*) Patients in whom there was any suspicion of an organic disease in the C.N.S. or of a psychotic illness. The decision to exclude patients on these grounds was based on a review of the cases made at the end of the investigation by the psychiatrist in charge. No patient had been in the neurosis centre less than a month when this review was undertaken.*
(*g*) Patients who appeared to have lost consciousness at some point during the test.
(*h*) Patients who smelt strongly of alcohol.†

Of the 47 normals seen, 5 had to be excluded on one or other of these points. Of the 70 patients tested, 33 had to be excluded, 12 on the grounds of age.

The average age of the neurotics was 34·1 years and of the normals 35·7 years. The mean height of the neurotics was 68·0 inches and of the normals 69·5 inches. The means of estimated weights were 143 lb. for the neurotics and 157 lb. for the normals. Although this suggests that the two groups might differ with respect to weight, it was found that the correlation between estimated weight and static ataxia was insignificant in both groups.

IV—RESULTS

(i) *Correction for Arbitrary Zero*

As described above, the results recorded were measurements of the maximum displacement forward (F) and backward (B) from an arbitrary zero point, during a given time. The first necessity, therefore, was to define the zero point more precisely and to make the appropriate correction to each measurement. This point has not been mentioned by previous writers who, presumably, fixed their zero points as accurately as possible using subjective judgments. Omitting to define the zero point precisely could have introduced a considerable error of measurement. The static ataxia measurements are not, of course, affected as, being the sum of F and B, they are independent of the position of the zero point.

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* One patient became suspected of being schizophrenic after the analysis was completed. Amounts of static ataxia and sway with suggestion in this case were 1·8 in. and 1·9 in. respectively.

† Three patients, who all admitted having been drinking on the afternoon of the test.

In this investigation the zero point was defined as the point midway between the position of maximum displacement in the forward direction and that in the backward direction during the initial 30 seconds. If F' and B' represent the maxima recorded during the initial 30 seconds, and F'' and B'' the maxima recorded during the $2\frac{1}{2}$ minutes of suggestion, all taken from some arbitrary zero point, it can easily be shown that a correction of $\frac{F'-B'}{2}$ must be subtracted from F'' and added to B'' to give the true readings taken from the zero point defined above.

The results of the investigation are stated in terms of the following variables:

$$\text{(i) Static ataxia} = F''_1 + B''_1$$

where F''_1 and B''_1 are the maxima recorded during $2\frac{1}{2}$ minutes without suggestion (first test).

$$\text{(ii) Sway with suggestion} = F''_2 - x \text{ or } B''_2 + x$$

(whichever is greater)

$$\text{where} \quad x = \frac{F'_2 - B'_2}{2}$$

and F''_2 and B''_2 are the maxima recorded during $2\frac{1}{2}$ minutes with suggestion (second test).

(ii) *Analysis*

Table III and the first two rows of Table IV show the distributions of normals and neurotics with respect to static ataxia and sway with suggestion.

TABLE III

Percentage distributions of static ataxia (inches)

	0–·9	1–1·9	2–2·9	3–3·9	4–4·9	5–5·9	Fell
Normals (42) ..	4·8	52·4	38·1	4·8			
Neurotics (37) ..	2·7	35·1	35·1	7·1	13·5	2·7	2·7

TABLE IV

Percentage distributions of sway with suggestion (inches)

	0–·9	1–1·9	2–2·9	3–3·9	4–4·9	5–5·9	6–6·9	7–7·9	8–8·9	Fell
Normals (42) ..	26·2	54·7	7·2	2·4	2·4			2·4		4·8
Neurotics (37)	5·4	45·9	18·9	10·8	8·1				2·7	8·1
Selected Neurotics (30) ..	6·6	56·1	19·8	9·9	3·3					3·3

The effect of variations in static ataxia can be eliminated by matching the two groups on this variable. This may be done reasonably well by removing from the neurotic group all individuals falling outside the range of the normal group in Table III. The remaining neurotics show rather more static ataxia than the normals but the difference is quite insignificant. Third row of Table IV shows the distribution of the thirty remaining neurotics with respect to the second variable, sway with suggestion.

In planning the investigation it was decided that a straightforward analysis using the "t" test would be appropriate. A "t" was to be calculated for the difference between the means of the two complete groups for both static ataxia and sway with suggestion. This was to confirm that Eysenck's findings could be repeated using these techniques and subjects. Assuming that both differences were found significant, the difference between the mean sway with suggestion of the normals and that of the thirty selected neurotics was then to be assessed for significance, again using the "t" test. Despite the obvious fact that the distributions were far from normal, this analysis was actually done as it was not thought that the departure from normality was sufficient to distort the results seriously. As a result of various discussions, however, several other methods of analysis were tried. The results of three analyses are reported. The first is the analysis using the "t" test as originally planned. The second is the application to the same data of the "U" test described by Mann and Whitney (1947). This is a non-parametric test based on the ranking of individuals in the combined group of normals and neurotics. It was chosen because it seems to make the best use of the information available without making any assumptions about the shape of the distributions.

TABLE V*

Levels of significance (P) of differences between neurotics and normals

	P derived from	
	t	U
Static Ataxia	< ·005	< ·02
Sway with suggestion	< ·05	< ·001
Sway with suggestion (selected neurotics)	< ·33	< ·005

* The detailed results are as follows:

TABLE VA

		Static Ataxia			Sway with suggestion		
	N	Mean	S.D.	Sum of ranks	Mean	S.D.	Sum of ranks
Normals	42	1·81	·60	1451·5	1·94	2·12	1332·0
Neurotics	37	2·56	1·42	1708·5	2·88	2·52	1828·0
t			3·1			1·77	
U			548·5			429	

TABLE VB

		Sway with suggestion		
	N	Mean	S.D.	Sum of ranks
Normals	42	1·94	2·12	1307·5
Selected neurotics	30	2·15	1·68	1320·5
t			·44	
U			404·5	

The results of the two tests of significance applied to the three comparisons are shown in Table V. The figures for the "t" test are included to illustrate the fact that the two tests can lead to quite different conclusions. As the "t" test involves assumptions which are certainly not justified with these data and as the "U" test assumes only that the distributions are continuous, conclusions are based upon the latter.

Considering the figures for the "U" test, then, two conclusions may be drawn. Firstly, they confirm that neurotics tend to sway more than normals on the Body-sway test, both with and without suggestion. Secondly, the difference between the two groups with respect to sway with suggestion cannot be accounted for by the presence in the neurotic group of a few individuals who are outside the normal range in static ataxia. The difference between neurotics and normals is still significant at the ·5 per cent. level even when the groups are selected so as to show no significant difference with respect to static ataxia. The evidence, therefore, supports the hypothesis that neurotics tend to respond more to suggestion than normals.

There are two considerations which detract from the validity of the second conclusion. The first is that the test of significance on which it is based was selected after the data had been collected and examined in detail. It was selected from a number of possibilities, many of which were actually tried. (Excluding the result of the "t" test, P varied between ·1 and ·03 depending upon which method was used.) The criterion for selecting this particular test rather than another was that it made the most use of the data available, whilst involving no assumptions about the shape of the distributions. Nevertheless, it is still open to the criticism that the method of analysis was selected, perhaps unconsciously, because it gave the answer which fitted the preconceived ideas of the investigator. The second difficulty is that the groups were not completely matched on static ataxia. The difference between them was insignificant, but the neurotics still showed slightly more static ataxia than the normals.

In an attempt to see whether this influenced the result materially, the groups were carefully matched for static ataxia by pairing. The difference in sway with suggestion now became insignificant, using the Wilcoxon test for matched pairs (Wilcoxon, 1947; Moses, 1952). Each neurotic was matched with a normal for static ataxia. Where there was more than one normal with the same static ataxia, the individual was chosen who was nearest, first in height, and, if an alternative was still possible, in age. Using this method it was found that, by chance, two neurotics who had rather high scores in sway with suggestion, had been excluded. If these individuals were included, the difference was almost significant at the 5 per cent. level. Two further points are (*a*) that it was only possible to select 28 pairs in this way and some data had to be discarded, and (*b*) that the Wilcoxon test makes use of different information (i.e. the amount of the difference between individuals in each pair rather than the relative order of individuals in the two groups). These three facts are probably sufficient to account for the discrepancy. Nevertheless, the difference was not significant using this method, which does throw some doubt on the validity of the general conclusion based on the Mann-Whitney test.

The third method of analysis which was used involved the assumption that response to suggestion could be defined as the difference between the maximum movement without suggestion and that with suggestion. If F_a and B_b are the maximum displacements from the zero point (defined above) during $2\frac{1}{2}$ minutes without suggestion, and F_s and B_s are the maxima recorded during the second $2\frac{1}{2}$ minutes with suggestion, the difference score is either $F_s - F_a$ or $B_s - B_a$ whichever is the greater. Table VI shows the distributions of difference scores in the two complete groups of normals and neurotics.

TABLE VI

Percentage distributions (difference scores)

	-3–2·5	3–8·5	9–14·5	15–20·5	21–26·5	27–32·5	33–38·5
Normals (42) ..	64	26	0	2	2	0	5
Neurotics (37) ..	33	47	11	0	3	0	6

In this case the difference is significant at the 2 per cent. level using the Mann-Whitney test.* The method was chosen after the data had been examined. The only other test of significance which was actually done, however, was the χ^2 test on a 2×2 contingency table with the cutting point between 2·5 and 3. χ^2, corrected for continuity, is 6·24 and P is less than ·01 using a one-tail test.

The definition of response to suggestion as a linear function of sway with suggestion and static ataxia might be questioned and would be difficult to justify except as a purely arbitrary measure. With the reservations mentioned, however, this method of analysis confirms that there is a difference between neurotics and normals with respect to response to suggestion on this test.

There were extensive ties in all the rankings concerned in these analyses. This did not, however, seem to affect the results appreciably. The application of corrections for the existence of ties and for continuity (Kendall, 1948) did not alter the levels of significance. The assumption that "U" is normally distributed under the null-hypothesis has been shown by Kruskal (1952) to be justified, even when there are ties of varying extents.

V—DISCUSSION

This investigation was the first step in an attempt to explain previous findings concerning the behaviour of neurotics in the Body-sway test of suggestibility. The phenomena with which we are dealing appear to be related in some way to neurosis, in the sense that they tend to appear in an exaggerated degree in neurotic patients. It seems almost certain therefore that, in so far as we are able to explain them and verify our explanations by experiment, our understanding of the illness or illnesses concerned, will be increased. If we could understand how this phenomenon of heightened response to suggestion is produced in certain patients (assuming that it occurs), we should surely be nearer to an explanation of all the abnormalities of function which make up their illnesses. So far we have been concerned entirely with the problem of establishing whether the phenomenon actually exists or not. Only when this has been done will it be possible to proceed to the next and much more interesting stage of developing explanatory hypotheses and testing them by experiment.

The main facts which have been established to date are that neurotics have a tendency to sway more than normals on the Body-sway test either with or without suggestion. The present investigation confirms the results of previous work in this respect. This is particularly important owing to the fact that both samples were from populations which differed in many respects from those of previous investigators. These facts may now be regarded as well established and fairly general in application, having been confirmed in a variety of different neurotic and normal groups, although two cases are on record of investigations which failed to find significant differences in sway with suggestion and one which found no significant difference in static ataxia (Clarke, 1950; Gravely, 1950; Hildebrand, 1953).†

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* The sum of ranks was 1638·5 for the neurotics making U=972·5.

† These investigations differed from the others with respect to both the measuring apparatus used and the way in which the suggestion was administered.

The primary object of this research was to determine whether the difference between the two groups on sway with suggestion could be accounted for by the static ataxia component of the Body-sway measurement. The results do not support the hypothesis that the difference can be accounted for in this way and indicate that the neurotics tend to respond more than the normals to suggestion. For the reason stated in the previous section, however, the evidence relating to this point cannot be regarded as entirely conclusive.

As far as the writer is aware, all investigators claiming to have found a positive relationship between neuroticism and suggestibility have assessed the latter by means of the Body-sway test. Before it is permissible to accept that neurotics respond more to suggestion irrespective of the particular test situation involved, it is necessary to establish that the phenomenon occurs in other situations. To obtain the evidence required on this point and to confirm the conclusion discussed in the last paragraph another investigation was planned making use of Hull's arm-movement test. The results of this investigation will be reported in another paper.

VI. SUMMARY

The Body-sway test of suggestibility, as described by Eysenck, does not allow a measurement of response to suggestion to be made independently of static ataxia. Because of this, the difference between neurotics and normals with respect to "suggestibility" as measured by this test may be entirely due to a difference in static ataxia.

To see whether this interpretation was correct, a group of normals and a group of neurotics were given the Body-sway test twice. They were first given the test without suggestion and fifteen minutes later they were tested in the usual way with suggestion. The two groups differed significantly with respect to the amount of sway both with and without suggestion. When those individuals who came outside the range of the normals with respect to sway without suggestion were removed from the neurotic group, the remaining neurotics still differed significantly from the normals with respect to sway with suggestion.

The two groups also differed significantly in response to suggestion when this was defined as the difference between maximum displacement with suggestion and that without suggestion.

It was concluded (1) that neurotic patients tend to sway more than normals both with and without suggestion and (2) that these neurotics tended to respond more than the normals to suggestion. Certain reservations had to be attached to the second conclusion and a further investigation is required for confirmation.

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A PROGNOSTIC STUDY OF INSULIN TREATMENT IN SCHIZOPHRENIA

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I—The Effects of Insulin Treatment

The following paper is concerned with the statistical analysis of the clinical data about nearly 500 schizophrenic patients. About half of these received insulin treatment, while the others did not. The patients were followed up for periods of between 5 and 10 years, so that the material is also classifiable by good and bad outcome. A full account of this clinical material, collected and studied at the University Psychiatric Clinic at Lisbon by one of us (P.P.), has already been published in the Portuguese language (Polonio, 1950).

Family History

The family histories of the patients were classified into 5 groups, and in this paper the same symbols are used to designate them as in the Portuguese monograph: H.O., no family history of mental illness, H.C., a family history of chronic mental illness, H.P., a family history of periodic mental illness, H.M., a family history of a mixed kind, H.A., a family history of other kinds, apparently unrelated to schizophrenia or endogenous psychosis, such as senile dementia or exogenous psychosis. There was no significant difference between the insulin and control groups in the representation of these 5 types of family history, and in the material as a whole they were distributed as follows: H.O. 37 per cent., H.C. 17 per cent., H.P. 13 per cent., H.M. 3 per cent., H.A. 31 per cent. Differences appear, however, when the material is classified also by outcome (Table I).

Table I

Proportion of Cases with a Favourable Outcome (Percentages)

	H.O.	H.C.	H.P.	H.M.	H.A.
Insulin Series	64	59	62	100	68
Control Series	34	46	50	50	53

The number of patients in the H.M. group is so small, only 13 in the whole material, that nothing can be said with certainty about the difference in this group between the insulin treated patients and the others. Apart from them we note that the group in which there is by far the biggest improvement on control figures obtained by insulin treatment is the H.O. group, i.e. that group which, without treatment, is the prognostically most unfavourable one.

In the Control series of 159 patients, only 22 of the 64 H.O. patients did well, but 48 of the other 95. The difference, to the disadvantage of the H.O. patients, is significant at the 5 per cent. level. In the insulin group however, there is no significant difference between the results obtained in the H.O. group and in the others. In the Insulin series, if we calculate what proportion of good results we could expect, judging by results in the Controls, we find that treatment provides an improvement of 85 per cent. in the H.O. group, of 29 per cent. in the others, as shown in Table II.

TABLE II

Insulin Series: Favourable Result	Expected	Observed	Improvement
H.O. (Total treated 91)	31·28	58	85%
All others (Total treated 173) ..	87·41	113	29%

This finding is of considerable interest. It has repeatedly been observed that schizophrenic patients with a family history of psychosis tend to have a better prognosis than those without such a family history, and the observation has been used to support the hypothesis of an effect of recessive genes in causing some forms of schizophrenia. In the present connection the suggestion which arises is that insulin treatment has the greatest effect where somatic predisposing factors are most adverse.

Age of Onset

When the proportion of good results obtained are sub-classified by age of onset (Table III), two interesting facts emerge. It will be seen that the spontaneous remission rate drops rapidly with age, though in the oldest age group it rises slightly again. In the insulin series the results are much more uniform, so that once again it is in the prognostically least favourable groups that insulin treatment produces its most marked effects. The spontaneous remission rate runs closely parallel with the proportion of cases with an acute onset. These are, in the six age groups named, 73, 58, 44, 40, 35, and 56 per cent. It would seem, therefore, that the recovery rate with insulin treatment is not only less dependent than the spontaneous remission rate on the age of onset, but also less dependent on acuteness of onset.

TABLE III

	Proportion of Good Results in Percentage					
Age of Onset	0–19	20–24	25–29	30–34	35–39	40–60
Control Series	70	50	46	37	30	37
Insulin Series	71	76	68	56	37	63

Body Build

There was no significant difference between the insulin and control series in the proportionate distribution of leptosomatic, pyknic, athletic and dysplastic body builds. In the material as a whole 51 per cent. of the patients were leptosomes, 20 per cent. pyknics, 17 per cent. athletics and 12 per cent. dysplastics. When, however, the material is subdivided into those who had and those who did not have a favourable outcome, there are striking differences between the insulin and control series (see Table IV).

TABLE IV

	Proportion of Good Results in Percentages			
Bodily Habitus	Leptosome	Pyknic	Athletic	Dysplastic
Control series	44	67	62	44
Insulin series	58	69	63	68

In the control series the patients of pyknic and of athletic physiques did conspicuously better than patients of leptosome and of dysplastic physique. In the insulin series, a favourable result seems to be much less dependent on physique; and whereas in the athletics and pyknics insulin treatment produced a negligibly better set of results than no insulin treatment, in the prognostically least favourable groups it provided a marked improvement. This result, again, is in conformity with the figures already given in respect of family history and age of onset. It is to be noted that, even with the help of insulin treatment, leptosome patients did not do better than athletics and pyknics not treated in this way.

Personality

When the patients were classified into those with a good and those with a poor personality, there was a slight difference between the insulin and control series, 43 per cent. of the insulin series and 36 per cent. of the control series having a good personality; but the difference is of an order to be readily accounted for by chance, $\chi^2=1\cdot3$, $P>\cdot20$. In the control series there were 48 per cent. of good results in the patients of good personality, 45 per cent. in those of poor personality, a remarkably small difference. In the insulin series the proportion of good results in those of good personality was 70 per cent., in those of poor personality 53 per cent. In the case of personality features, therefore, insulin treatment has a differentially more favourable effect in the group in which, in any case, the prognosis is slightly the better.

Psychogenic and Exogenic Factors

In the material as a whole causative factors of these kinds were present in about 28 per cent. of the cases, and were about equally common, each being present in approximately 14 per cent. Physical exogenic factors were slightly more frequent in the control series, and psychogenic factors slightly more frequent in the insulin series, but the difference is not significant. In the control series the remission rate in cases with psychogenic precipitation was 58 per cent., in the insulin series 69 per cent., so that the difference is not a large one.

The fact that if psychogenic factors are present the outcome is rather better than otherwise, both in the treated and untreated series, should be only cautiously applied clinically. Where schizophrenia supervenes on a long history of conflicts and difficulties in adaptation, the prognosis is poor. In other cases it was found that psychogenic factors were the cause of a psychogenic reaction which might either recover or change progressively into a typical schizophrenic picture—the "Hintergrundreaktion" of Kurt Schneider. At the time of its onset, schizophrenia predisposes to an excessive susceptibility to psychogenic causes of upset, and a psychogenic reaction occurring then may mask the oncoming schizophrenia and be for a long time its only manifestation.

In the cases with exogenic physical causative factors the remission rates were in the control series 50 per cent., in the insulin series 81 per cent. Here the difference is a big one, and is much bigger than in the group with psychogenic causation. Once again, this indicates the somatic mode of operation of insulin treatment.

The causative relationship between physical factors and schizophrenic or schizophrenic-like psychoses is not always clear. Endogenous schizophrenic psychoses may have marked physical aspects, in the form of psychomotor agitation, incoherence of thought, auditory and visual hallucinations, and alterations of consciousness, these psychological symptoms being accompanied by somatic ones such as fever and leucocytosis. This may be so even though there is no clear evidence of a definite physical illness, and no physical causative factor can be pointed to. In some cases the endocrine crises of adolescence, climacteric and involution may be regarded as exogenic factors, predisposing to schizophrenia by decreasing bodily resistance.

However in other cases a physical condition was diagnosed early on, for instance delirium tremens which progressed through an alcoholic hallucinosis into a typical schizophrenic state with alteration of personality and other characteristic symptoms. We think it probable that an exogenic psychosis may evolve into what is clinically a schizophrenic psychosis, even though neither specific genetical factors nor a schizoid personality are present.

Onset, Prodromata, Duration

In the material as a whole 38 per cent. of the patients had a sudden or rapid onset and 62 per cent. an insidious one; there was little difference between the insulin and the control groups. Prodromata were frequent, though unfortunately not often looked for. Neurasthenia, over-ready fatigue, insomnia, loss of weight and symptoms suggestive of a somatic factor were more frequent in patients with an acute onset, and lasted from a few weeks to three months.

	Proportion of Good Results in Percentages	
	Insidious Onset	Sudden Onset
Insulin Series	58	77
Control Series	33	41

Suddenness of onset was, therefore, a favourable prognostic feature in both insulin and control series. We have noted previously that insulin produced a maximum improvement on control results in the prognostically least favourable groups; but here this is not the case. The improvement from 41 per cent. to 77 per cent. in the groups with sudden onset is rather better than the improvement from 33 to 58 per cent. We may associate this again with the relative predominance of the somatic aspects of illness in the group with sudden onset.

The first symptoms of schizophrenia were very variable with both types of onset and not infrequently atypical. The following unspecific early forms of illness were fairly commonly observed:

1. A neurotic picture, such as (sudden) an acute hysterical twilight state, or (insidious) the gradual appearance of hypochondriasis and ideas of reference.
2. An exogenic picture, such as (sudden) an acute confusional psychosis with fever, delirium and visual and auditory hallucinations ("amentia" in the Continental sense), or (insidious) vague but progressive neurasthenic symptoms.
3. Sudden or insidious depressive and manic-like symptoms.

Duration of illness is so closely connected with acuteness of onset, the acute cases coming quickly to hospital, that it does not need special discussion.

Features in Combination

Certain features tended to be combined together so that rather vaguely defined clinical types seemed to emerge. Schizophrenia in pyknic individuals was usually of acute onset and of less than one year's duration. These patients had better personalities than the others, and exogenic precipitating factors were more often present. The natural history of the disease was more benign.

Leptosomes, on the other hand, were generally of poorer personality, had an insidious onset of longer duration and an unfavourable course.

A periodic course showed no close connection with bodily habitus, but in both pyknics and leptosomes was correlated with an acute onset and a short duration. There was one feature of contrast: in the pyknics it went with an endogenous mode of onset, while in the leptosomes it was often associated with exogenic and with psychogenic precipitating factors.

Guiding Principles in Insulin Treatment

As schizophrenia is such a serious illness, treatment must not be skimped. Insulin treatment should not be regarded as having failed if less than 50 to 60 comas have been given. If we had confined the number of treatments to 30, the proportion of total and social recoveries would have dropped to 60 per cent. of what was actually obtained. Combining insulin treatment with about 9 cardiazol or electric shocks increased the recovery rate in about 30 per cent. of the patients.

The leptosomes who recovered put on under treatment an average of 15 pounds; recovering pyknic and athletic patients put on 14 and 11 pounds. The mean increase was much lower in those of all constitutional types who did not recover, averaging 6 pounds. Weight increase correlates very well with a good prognosis, and while weight is still being put on the treatment should be continued. If after treatment the weight drops again, a relapse is to be feared.

Insulin has a favourable effect on the personality. It increases the affective rapport and the degree of extraversion and makes for an earlier adjustment and a more objective attitude to all mental symptoms, especially delusions and hallucinations. The effect on the personality is still noticeable when recovery does not occur, and aids other treatments such as psychotherapy, occupational therapy and social rehabilitation. In some cases relatives and friends have commented with surprise that the patient's personality was actually better after treatment than it had been before the illness.

There is one curious personality change, seen as a sequela after recovery from schizophrenia, which we have observed with greater frequency than before the insulin era; this might be called pseudo-psychopathic schizophrenic defect. Although from all appearances the intelligence is undamaged, these patients commit serious errors of judgment and insight, and show a remarkable impoverishment of ethical feeling and sense of values, whether spiritual or objective. They easily lose contact with reality, and this loss of contact makes for behaviour which is similar to autism. But these patients are not shut in or introverted or queer, do not have an inner life of fantasy substitutes for reality, and do not have delusions or ideas of reference. Their mental life is empty and superficial, out of touch with reality because they lack the ability to value reality, and their behaviour has many similarities with that of irresponsible children or immature adolescents.

The period of hospitalization in our material was reduced by insulin treatment from 16·8 months to 5·4 on the average. The mortality in the insulin group was over 10 years 13·5 per cent., in the controls 31·9 per cent. This remarkable difference was not due to the insulin shock treatment alone, but also to maintenance insulin and electro-shock treatment in chronic hospitalized cases, to the more hygienic way of life the treated patients were enabled to live, the active occupational therapy regime, and the improved nursing, all made possible in this way.

Relapses were most frequent both in insulin and control series in the first year, decreasing rapidly in the second and third years and more slowly thereafter. Full recovery is more stable than merely social recovery or recovery with defect. The rate of relapse was about the same in both treated and untreated groups.

Mode of Action of Insulin Treatment

Apart from its general beneficial effect, insulin treatment seems to be particularly valuable in those patients who, apart from such treatment, would have a less than normally favourable prognosis, i.e. in those with a negative family history, the least favourable age groups, the leptosomatic and the dysplastic physiques. The effect of the treatment is to even out the difference between those on the favourable and those on the unfavourable side in these classifications, and to nullify the effect of the unfavourable factor. On the other hand the psychological aspects of the constitution, good or poor personality, do not show this effect: insulin has a greater effect in patients of better personality.

This curious combination of circumstances seems to suggest that the action of insulin treatment is predominantly a somatic one, in supplying artificially a quality which is provided naturally by the pyknic or athletic bodily constitution. Insulin would seem, in fact, to increase the bodily resistance to schizophrenia in those who have little powers of resistance, though it is to be noted that, if there is an accumulation of many unfavourable factors in any one case, insulin

TABLE V

Classification of Patients by Clinical Features and by Result of Treatment

				Leptosomes			Pyknics			
					Result			Result		
				Good	Poor	Total	Good	Poor	Total	
MP	O	S	1A+	—	1	1	1	—	1	
			1A−	10	6	16	6	2	8	
		I	1A+	3	34	37	3	13	16	
			1A−	2	3	5	4	5	9	
	PE	S	1A+	1	2	3	1	—	1	
			1A−	10	2	12	9	4	13	
		I	1A+	9	17	26	6	10	16	
			1A−	5	4	9	5	2	7	
	Total			40	69	109	35	36	71	
BP	O	S	1A+	—	2	2	—	—	—	
			1A−	9	4	13	14	1	15	
		I	1A+	2	10	12	8	9	17	
			1A−	5	1	6	—	1	1	
	PE	S	1A+	1	1	2	—	2	2	
			1A−	10	3	13	17	2	19	
		I	1A+	3	6	9	3	1	4	
			1A−	2	1	3	8	1	9	
	Total			32	28	60	50	17	67	
Grand Total ..				72	97	169	85	53	138	307

MP=poor personality; BP=good personality; O=no precipitation; PE=precipitation by psychogenic or exogenic causes; S=sudden onset; I=insidious onset; 1A+=duration of 1 year or more; 1A−=duration of less than one year.

treatment is likely to be powerless. The suggestion of a predominantly somatic action is also supported by the observation that a good prognosis is positively associated with gain in weight under treatment. All these findings are in line with Kallmann's observations on schizophrenic twins, that resistance to the disease is closely connected with an athletic physique and with the general nutritional state, and that in the genetically predisposed individual debilitating conditions are especially liable to lead to the manifestation of the disease process.

II—The Prediction of Failure or Success with Insulin Treatment

We now come to consider the predictive value of the various clinical features which have been found to be associated with a good or bad prognosis, not singly but in combination. For this purpose the clinical records of 307 patients were available.

The material has been dichotomized in six different ways, each of them providing fairly evenly balanced numbers on either side. The clinical result of treatment could be classified as good in 157, poor in 150; bodily habitus as favourable (athletic or pyknic) in 138, leptosomatic and unfavourable in 169; the personality as good in 127, poor in 180; the onset as sudden in 121, insidious in 186; the duration as less than 1 year in 158, more than a year in 149; there was precipitation by exogenic or psychogenic causes in 148, no precipitation in 159. The complete table, reproduced from Table 31 of Polonio's monograph with correction of printer's errors, is given in Table V.

Owing to the fact that the dichotomies lead to fairly evenly balanced numbers, the use of tetrachoric correlation coefficients is justifiable. The calculation of these for the dichotomies taken in pairs provides the following table:

Table VI

Intercorrelations between Result and Clinical Features

	1	2	3	4	5	6
1. Good Result		+·669	+·544	+·352	+·294	+·290
2. Short Duration	+·669		+·852	+·275	+·196	+·181
3. Sudden Onset	+·544	+·852		+·313	+·098	+·141
4. Good Personality ..	+·352	+·275	+·313		+·207	−·005
5. Pyknic	+·294	+·196	+·098	+·207		+·092
6. Precipitation	+·290	+·181	+·141	−·005	+·092	

The correlations which interest us are those between the clinical result of treatment and the other characteristics. We should like to use the other characteristics in order to prognosticate the result of treatment. As these other characteristics are correlated among themselves, they cannot be used, more than one at a time, as they stand. For instance, shortness of duration is so closely connected with suddenness of onset, that if we estimate the probability of a good result from the former we cannot make an equivalent use of the latter—we should be making use of the same feature twice over.

This difficulty can be obviated by extracting partial correlation coefficients for each of the correlations which interest us, when all the others are held constant. When this is done a new set of values is obtained as follows:

$$r_{12\cdot3456} = +\cdot441$$
$$r_{13\cdot2456} = -\cdot084$$
$$r_{14\cdot2356} = +\cdot335$$
$$r_{15\cdot2346} = +\cdot177$$
$$r_{16\cdot2345} = +\cdot311$$

From this we can see that, if we are going to take account of duration of illness (r_{12}), we can totally neglect the nature of the onset (r_{13}), as the negative correlation is inconsiderable.

As a rough and ready measure we can assign weights to the various prognostic characteristics, using as a basis the squares of the partial correlation coefficients. This gives for r_{12} a weight of 2, and for r_{14} and for r_{16} a weight of 1, the rest being negligible. For every cell of Table V there will be a prognostic weight of 4, 3, 2, 1 or 0. We may then observe how the various weights, or scores, actually match the results obtained. This is given in Table VII.

TABLE VII

Association of Prognostic Score with Clinical Result

Prognostic Score	Number of Patients	Proportion of Total	Number of Good Results	Proportion of Good Results
0	55	18%	7	13%
1	77	25%	27	35%
2	55	18%	29	53%
3	76	25%	57	75%
4	44	14%	37	84%

The patient's prognostic score gives, therefore, quite a good indication of the eventual outcome; where it is lowest only 13 per cent. of good results are obtained, where it is highest 84 per cent. Each scoring category contains a sizeable proportion of the total material, varying from 14 per cent. to 25 per cent. of the whole, and as the score ascends from 0 to 4 there is a steady climb in the proportion of good results obtained. This suggests that such a scoring system, awarding two marks for a duration of illness of less than 1 year, one mark each for good personality and for the presence of precipitation, might prove serviceable in practice. If its accuracy were borne out by the studies of others, we might be able to improve our prognostic judgment in schizophrenia, which is notoriously subject to great errors. As the figures stand, we should be able to give a good or a bad prognosis in a third of our patients, with an 85 per cent. chance of being correct in the upshot, to estimate the chances as three to one in favour or two to one against in half of the patients, and to be left only in the remaining sixth with a toss-up either way.

SUMMARY AND CONCLUSIONS

From a follow-up, five to ten years after hospital admission, of about 500 schizophrenic patients, about half of whom had been treated by insulin coma therapy and the other half not so treated, the following conclusions emerged:

1. Patients with no family history of mental illness had a lower chance than others of a spontaneous remission; this disadvantage was nullified by insulin treatment, under which patients with all types of family history did almost equally well, and better than controls.
2. Spontaneous remission rates drop with increasing age of onset, while rates of remission with insulin treatment remain much more steady; as with type of family history, the prognostically least favourable group derives special benefit from insulin treatment.
3. Spontaneous remission rates are better in persons of pyknic and athletic physique than in leptosomes and dysplastics; insulin remission rates vary little with physique. Again it is the prognostically least favourable group which has most to gain from treatment.
4. Patients with a good personality did better than others, in both insulin and control groups; insulin treatment did not nullify the relative disadvantage of a poor personality.
5. Insulin treatment provided only a slight improvement on control expectations in cases with psychogenic precipitation, but a very marked improvement in cases with physical precipitating factors.
6. Insulin proved a rather more powerful aid to recovery in cases with a sudden onset than in those with an insidious onset, even though the former also did better than the latter in the control group.

7. Gain in weight under treatment was a prognostically favourable sign. It is held that insulin treatment should not be stopped while weight is still being gained, nor regarded as failed before at least 50 comas have been given.

8. The period of hospitalization was reduced by insulin treatment from 16·8 months to 5·4 months. In the control series the mortality over 10 years was 32 per cent., in the insulin group 13·5 per cent.; however this great improvement in mortality is not due to the insulin treatment alone.

9. It is held that the findings noted in paragraphs 1-7 above support the view that the action of insulin treatment is predominantly somatic, increasing powers of bodily resistance to the disease.

10. As a result of an analysis of inter-correlations, it was found that assigning weights to certain clinical features (+2 for duration under 1 year, +1 for good personality, +1 for presence of precipitation, psychogenic or exogenic) provided a marking system which gave quite an efficient prognosis; thus 84 per cent. of those with a score of +4 had good results but only 13 per cent. of those with a score of 0.

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ALCOHOLISM AND ATTEMPTED SUICIDE

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In her sociological study of suicide Cavan (1928) commented that "up to date no adequate studies have been made of the relation of the habit of drinking to suicidal tendencies". Ten years later, Merrill Moore (1939) makes a similar complaint: "What relation, if any, is there between alcoholism and suicide? This question has never been definitely answered and little has been written about it . . . In the entire literature of medicine hardly more than twenty acceptable articles on this subject are recorded." Little has been written on the topic since then.

A century ago the relationship of alcoholism and suicide was receiving attention from British and Continental physicians, some of whom considered alcoholism to have the foremost place in inducing suicidal acts: and it is illuminating still to read a discussion of those days. In a book on alcoholism Dr. Charles Wilson (1855) of Edinburgh expressed his opinions both perceptively and eloquently:

". . . should [the alcoholic] lift his hand against his life, armed with an instrument more promptly fatal, it is by a kind of double suicide that the last act is perpetrated. The more gradual self-destruction, which simulates disease, is crowned by the rapid catastrophe which kills by violence. It is the character of the act which is changed, but not its essence." This is the theme which more recently Menninger (1938) has elaborated in his well-known description of alcoholism as a "chronic suicide".

Clinically, Wilson identified two types of alcoholic suicide, and much of what he wrote about them remains valid.

"There are two forms under which the tendency to suicide exhibits itself in the confirmed drunkard, and it is of considerable practical importance that these should be distinguished. In the one form, the act assumes the appearance of cool deliberation, has frequently been long contemplated, and is approached with every precaution to prevent detection, and to secure its completion . . . in some moment of more than ordinary desperation, or during the shame and depression consequent on some more than ordinary excess, the fatal blow is struck."

"Under the second form . . . the act itself is without premeditation, in the strict sense of the term, and is a direct consequence of those more violent states of disorder of the intellect, for which he is no further responsible than that they are the result of his excesses. In attacks of delirium tremens, his delusions are sometimes of so painful a nature, and the phantasms which surround him so full of horrors, that he rushes to avoid them with a panic terror which gives no scope for hesitation . . . But even during the fit of drunkenness itself, and without the presence of any other delirium than that directly attendant upon the intoxication, there appears occasionally, in certain individuals, a remarkable disposition to commit self-murder . . . An ill-timed reproof, or a threat, levelled against the drunkard while in a state of excitement, has induced him to perpetrate instant suicide; and the sudden detection of a long career of excess, assiduously disguised under the mask of indisposition, has been known to lead to an attempt of a similar description . . ."

Fifty years later Sullivan (1906) was claiming that both statistical findings and clinical evidence gave alcohol the chief role in the genesis of abortive suicidal impulses. He considered the alcoholic suicide as a special variety, characterized by its impulsiveness and the relative youth of those most typically involved. 77·5 per cent. of 142 cases of attempted suicide were attributed by him (1898) to alcoholism.

East (1913), reviewing 1,000 male cases of attempted suicide, found that in 39 per cent. alcohol was wholly or partially the cause of the attempt. Both Sullivan and East stated that in a large proportion of their cases the individual was drunk to the degree that he had an amnesia for his act.

Henderson in his Salmon lectures (1939) dealt with alcoholism and suicide as clinical manifestations of Psychopathic States, particularly of those types which may be described as predominantly aggressive. He states that "it is an almost identical type of disposition which uses these agents [alcohol and drugs] as commits suicide or perpetrates a serious assault which may result in murder. It is merely another way of escaping from reality, more pleasant perhaps, but by no means less deleterious either for the individual or for society." This contribution, which widens and clarifies the clinical issues and social implications, should be directly consulted. Elsewhere Henderson (1936) has written with reference to suicidal acts, "The degree of alcoholism need not, by any means, have proceeded to the stage of delirium, but sufficient is taken, usually, to deaden or lower consciousness."

Moore (1939) made a retrospective survey of the records of 143 alcoholic suicidal patients admitted to the Boston City Hospital. Though the paper contains the admission that only a few superficial formulations about these patients could be made, useful factual data are recorded. It is suggested that alcoholic suicidal patients as a group are less successful than suicidal patients in general: and that there is a distinction (not formulated) between alcoholic suicidal patients and suicidal alcoholic patients. 11 per cent. of 1,195 cases of attempted suicide were found to be alcoholic.

Dahlgren (1945), whose book may be referred to for details of the continental literature, concluded that the majority of authors have ascribed a comparatively great importance to alcoholism as a suicide-eliciting factor. He found in Sweden that 46 per cent. of the males who attempted suicide, but only 2 per cent. of the females, abused alcohol. He comments, "even if the sometimes presented statement that alcohol makes a suicidal attempt less effective, were true, there does not seem to be any essential difference between suicide and attempted suicide cases as regards the frequency of inebriates". The reaction types of the subjects investigated are detailed in this survey.

In summary it may be said that a conspectus of the literature reveals that there is still some uncertainty on many important points. For example—what is the role of alcoholism in suicidal attempts, and what is its frequency and importance? What is the usual degree of drunkenness at the time of the suicidal act? How dangerous is the suicidal attempt made under the influence of alcohol? Is there such an entity as "the alcoholic suicide"? Is suicide a common outcome in chronic alcoholism, and what type of pathological drinker attempts suicide? Can one in fact distinguish between alcoholic suicidal patients and suicidal alcoholic patients?

THE CASE MATERIAL

The material on which this paper is based consists of 200 (male 92, female 108) consecutive cases of attempted suicide admitted to a general hospital in the years 1950-52, and personally observed. The sample is probably representative of an urban population, since the large majority of all suicidal attempts occurring in the city of Edinburgh are admitted to this hospital.

The incidence of alcoholism in the family histories and childhood homes of the group as a whole, will be reported. Forty-three (21·5 per cent.) of the cases gave a personal history of excessive drinking: these will be described in detail. A further 16 individuals in the group, who attempted suicide while drunk but who had not been addicted to alcohol, will be more briefly presented.

FAMILY HISTORIES AND CHILDHOOD HOMES

In 200 consecutive cases of attempted suicide there was found a family history of alcoholism in first-degree relatives in 28·5 per cent. 24·5 per cent. of these 200 suicidal individuals came from homes "broken" because of parental alcoholism:

	Cases of Attempted Suicide		
	Male	Female	Total
Broken homes due to:			
Alcoholism in Father	23	20	43
Alcoholism in Mother	7	7	14
Alcoholism in both parents	2	6	8

(For a discussion of these findings, see Batchelor and Napier, 1953.)

Among the cases which are the subject of this paper, a family history of alcoholism in first-degree relatives was obtained from 22 (51·2 per cent.) of the 43 excessive drinkers, and from 5 (31·3 per cent.) of the 16 individuals who were not pathological drinkers but who were drunk at the time of their suicidal attempts. Both sexes gave similar percentages.

These bare figures give some measure of the great frequency, but can give no picture of the quality, of disturbances in the childhood home-life of individuals who later became alcoholic and suicidal.

THE GROUP OF PATHOLOGICAL, EXCESSIVE DRINKERS

This group, which gave histories of often repeated excessive drinking of alcohol, comprised 21·5 per cent. (male 32·6 per cent., female 12·0 per cent.) of those who attempted suicide.

Their characteristics are shown in the tables below:

	Male	Female	Total
Sex	30	13	43
Age: 20–29	3	2	5
30–39	5	4	9
40–49	9	2	11
50–59	9	2	11
60 and over	4	3	7

	Male	Female	Total
Marital State			
Single	5	2	7
Married	15	5	20
Widow(er)	2	3	5
Separated or divorced	8	3	11
Present Social Class:			
I. Professional	1	2	3
II. Intermediate between I and III	5	1	6
III. Skilled workers	2	2	4
IV. Intermediate between III and V	9	1	10
V. Unskilled workers	13	7	20

Previous Personal Adjustment

The large majority of the group showed serious evidence of maladjustment in more than one sphere.

Social Adjustment. It will be noted that nearly half the group are found in the lowest social class (V). In the case of 16 of the men, and 4 of the women, their present social status was inferior to that of their childhood.

Employment Adjustment. Of the 30 men, 24 had unsatisfactory work records: 10 were unemployed at the time of their suicidal attempts and a further 5 were off work. Half of the women had unsatisfactory work records. Though the large majority of the women were carrying on with their household duties, it was at an impaired level of efficiency.

Sexual Adjustment. Of the 30 men, 9 showed homosexual trends (one of these was a practising homosexual), while 8 others were heterosexually promiscuous. Of the 13 women, 6 were heterosexually promiscuous (one of these also homosexually so), and 3 others were frigid. It will be noted also from the table above that 41·9 per cent. of both sexes were single or separated from their spouses.

Diagnoses	Male	Female	Total
Psychopathic states	13	6	19
Depressive states	11	4	15
(First attack	6	1	
Previous attack(s)	5	3)	
Chronic alcoholism	3	2	5
Epilepsy	2	1	3
Mental defect	1	0	1

It is obvious that the classification adopted here is somewhat arbitrary. The fact that only 5 of these 43 individuals have been diagnosed as chronic alcoholics, requires explanation. The term "chronic alcoholic" itself is not altogether satisfactory: it is descriptive at a superficial, symptomatic level, and there may be argument in certain cases whether the use of and dependence upon alcohol have become of such degree as to justify the diagnosis. However, if we employ it to depict the individual who has been steadily addicted to alcohol over many years, whose alcoholism is the central feature of his abnormality, and whose deterioration in character and intellect are insidious, it appears that such individuals constitute a small minority of the suicidal group. The impressions of clinical experience are borne out by the findings of the present investigation. Two of the 5 chronic alcoholics had for some time previous to their suicidal attempts been more than ordinarily dejected, and might have been alternatively described as suffering from depressive states.

The large majority of the group was composed of psychopaths and depressives. Nine of the 15 depressives were considered to be suffering from Manic-Depressive Psychoses: in the others the clinical picture was less clear-cut, more obviously reactive and gave evidence of neurotic trends. In at least one-third of the depressives the alcoholic habit had been dipsomaniac. Some of the psychopaths were also intermittent though excessive drinkers. That only one of those not labelled "Chronic alcoholic" showed marked evidence of liver and peripheral nerve damage, also suggests that in the majority of cases the alcoholic over-indulgence had not been continuous.

THE SUICIDAL ATTEMPTS

Method	Male	Female	Total
Poisoning:			
Barbiturate	12	8	20
Coal gas	4	3	7
Other	7	2	9
Cutting	7	—	7

The limited variety of methods is rather striking. Poisoning was used by 83·7 per cent. of the cases. "Other" poisons included aspirin, epanutin, bromide and chloral mixture, and methylated spirits (there is some evidence that the individual who took the last with suicidal intent, was also using it as a drug of addiction). The main method only has been listed: two persons used combined methods; a man, cut throat and gassing; a woman, barbiturate poisoning and cutting.

Timing: The most favoured months for the suicidal attempts were October, November and May. Five psychopaths made their attempts between 10 p.m. and midnight, upon returning home drunk. In 4 depressives, hangover effects had been added to the matutinal worsening of depressive symptoms.

Drunk or sober: It is noteworthy that 20 (46·5 per cent.) of these excessive drinkers were *not* under the influence of alcohol at the time of their attempts. This was true of 73·4 per cent. of the depressives and 47·4 per cent. of the psychopaths. The majority of the depressives who were sober had been drinking until shortly before their attempts: but three had not had a drink for more than a month and one individual probably not for some years.

Precipitants: The essential determinants of these suicidal acts lay in the past. In two-thirds of the cases, however, environmental circumstances had played an immediately important role as precipitants. This reactivity to current events was more apparent in the psychopaths than in the depressives: in 9 out of the 15 depressives there was no identifiable immediate precipitant. The commonest antecedents were explosive quarrels, usually with a spouse or lover; and the threat or onset of court proceedings for debt. Three men made their attempts upon being jilted: two of the women, when admission to a mental hospital seemed imminent.

The Seriousness of the attempt: The determination behind a suicidal attempt may be very difficult to measure and cannot be judged by any one criterion. In the case of poisonings, so frequent in this group, the depth of the unconsciousness produced is not by itself a safe guide: there are so many variables, the amount and type of the drug available, the rate of its absorption, the time elapsing before treatment; and complicating these, the fact that the actions of alcohol and barbiturates are at least additive and that there may be mutual potentiation. The details of the methods used and the extent of the injuries, attempts at concealment, the individual's feelings before and his statements and attitude after the attempt, the accompanying symptoms, the contents of farewell notes, these are some of the things which must be taken into account in assessing each act. In the present group, two-thirds of the attempts (both by men and women) were adjudged serious: but for prompt and effective treatment there would have been a considerable number of fatalities. In the cases of the other third there were elements of doubt. Whereas the depressives had usually for some time contemplated and deliberated over their attempts, the large majority of the psychopaths had acted impulsively: their sudden outbursts of rage, reactive usually to acute frustration, seemed sometimes not directed towards any definite goal. In two or three the element of evasion was so obvious that there was some suspicion of counterfeit. All these acts had however been accepted as suicidal by the police or the relatives. It is important to add that a blasé individual may stage a highly dramatic attempt, which is yet serious.

Loss of consciousness: The attempt led to complete loss of consciousness in 33 and partial loss in 2 others of the 43 cases. It is clear that whether or not death was intended, withdrawal was an urgent desideratum.

Subsequent amnesia: Of the 22 individuals who were under the influence of alcohol at the time of their attempts, only 5 claimed an amnesia for the act. In one of these 5 cases the amnesia was partial; and in another it was probably feigned.

It is evident that very few of this group had been "dead drunk" at the time of their suicidal attempts. They were not even sufficiently drunk to abolish the (at least partial) appreciation and registration of what they were doing. One man was in a state of acute alcoholic hallucinosis at the time of his attempt, but he was able afterwards to give a detailed, written account of his symptoms and actions.

In all, 38 individuals were investigated who had been drunk at the time of their suicidal attempts: only 5 had any amnesia. These findings are at variance with the opinions of East quoted earlier. One explanation of this could lie in the fact that East examined his subjects while they were in prison on remand. Fear of legal consequences is apt under such circumstances to inhibit memory.

Aspects of the Psychopathology

Attention will be given only to a few of the more outstanding features.

In every case of chronic alcoholism, and in most cases of attempted suicide, there is a serious underlying personality disorder. But there is no uniform psychopathology. Many types of temperamental instability, neurotic conflict and psychotic reaction are encountered. Diagnostic categories are first approximations only to explanations.

Alcoholism and suicide are alike modes and degrees of escape from states of anxiety and depression, whether these are reactive to external circumstances or the reflections of inner disharmony. Not infrequently it is difficult to determine how permanent was the oblivion sought.

In the discussion of chronic alcoholism emphasis is commonly laid on the gratification of oral narcissistic needs, frustrated in infancy with the development of feelings of intense disappointment, rage and inferiority, which later demand belated and persistent satisfaction by mouth. An explanation along these lines (over-simplified as stated), is relevant to many cases, though certainly not to all. The history of a broken home in many instances in the present series, the frequent inadequacy and immaturity of the previous personality, the strikingly high percentage of attempts by poisoning (by mouth) and the egocentricity and wish-fulfilling aspect of many of these acts, would fit into such an explanation. The equivalence between the crassly self-sufficient euphoria of the alcoholic when drunk and the feelings of infantile omnipotence revealed in some suicidal attempts, is also noteworthy. But the theory is too restricted. Chronic alcoholism is a reaction to the anxieties associated with many types of conflict: so is suicide.

Castration anxieties and symbolic castration may be revealed in the suicidal attempts of some excessive drinkers; but it is in a small minority of these. In this series one man's suicidal attempt (Case 93) took the form of an incision to reach his appendix: it was preceded by other episodes of self-mutilation, when he gashed his abdomen and the upper and inner aspects of his thighs. Another man (Case 116), during a period of vivid hallucinosis immediately preceding his suicidal attempt, believed that a woman had "lacerated his leg" with a sharp instrument.

The terror of an acute alcoholic hallucinosis may drive a man to blundering self-destruction. Much more commonly anxiety and depression, which demand relief, are derived from guilt associated with the sexual deviations and the aggressive impulses which are frequent in this group. The anxiety may be accompanied by phobias of and impulses towards injuring others. When a depressive psychosis is the fundamental disturbance, guilt is usually a main factor both in the excessive drinking and in the suicidal attempt, which is an atonement.

Both alcoholism and attempted suicide are in themselves patently aggressive reactions. Causing so much offence to relatives and to society as a whole, they give a sense of power. Many of the suicidal attempts in this series—particularly those perpetrated by psychopaths, were acts of spite, pique and revenge. Frequently openly hostile or assaultive behaviour towards others preceded the self-injury.

For the schizoid and insecure, alcohol is a passport from loneliness to the company of fellow-men. But it leads eventually and inevitably to his rejection by the society he seeks. Loneliness and the need for belonging are also fundamental factors in many suicidal acts. A suicidal attempt may signify at the same time an appeal for and a rejection of help. The alcoholic is similar both in his need and in his ambivalence.

Individuals Drunk at the Time of Their Suicidal Attempts, but not Pathological Drinkers

Of the 39 (19·5 per cent.) individuals who were under the influence of alcohol at the time of their suicidal attempts, 16 (10 men, 6 women) had *not* previously been persistently excessive drinkers. Ten of these 16 were aged 20-39, 3 were middle-aged, 3 were over 60 years. Eight were married, 4 widowed, 4 single.

Thirteen of these 16 individuals were suffering from Depressive States, 2 were Psychopaths, one could hardly be described as ill. The depressive reactions were predominantly reactive to environmental stresses, deprivations and frustrations.

Alcohol had been used before the time of the suicidal attempt, sometimes for some months, more or less deliberately, to relieve tension and to dull the pain of events. This anodyne having failed, suicide was attempted. But it must be emphasized that the decision to die was not reached rationally: the majority of the attempts were not planned, but impulsive. Though usually feelings of hopelessness and suicidal thoughts had been present (at least intermittently), only four individuals admitted to pondering their acts in any detail. Retrospectively, it was evident that emotions had become overcharged, to build up to a dangerously explosive situation: and that an amount of alcohol less than that required to produce even marked inco-ordination, had been sufficient to weaken the controls opposing a violent outburst. None of these individuals had an amnesia for the attempt. Yet, with two or three exceptions, the genuineness of their suicidal intentions—however transient those intentions may have been—was not in doubt. After the attempt, control over the suicidal impulse was by the majority soon regained; which suggests of course that without the influence of alcohol some of these attempts might not have been made.

Alcohol both released the impulsive behaviour and tended to render it less lethal: in some instances the suicidal individual contributed to his ultimate safety by drawing attention to himself on account of his drunkenness, or by making a confession shortly after his act, or by scamping measures to make the attempt fully effective, e.g. by concealment, or by shutting windows before turning on the gas. Fifteen of the group made their attempt by poisoning (barbiturates, aspirin, lysol, sulphonamide, amphetamine, coal gas, nitrous oxide). It will also be noted that not all of the poisons were well chosen.

This group of unsuccessful suicides could not be expected to give much evidence of how alcohol can make a suicidal attempt more dangerous (apart, that is, from its pharmacological action). That it may do so, however, was demonstrated in the case of one man, who was left lying unconscious on the assumption that he was simply drunk, and whose life was thus endangered.

Two illustrative cases from this group may be quoted briefly:

Case 22.—A labourer aged 38. During a depressive reaction following the death of his wife he became attracted to a young woman. Their relationship was stormy, attended by guilt on his side and erratic conduct on hers. Finally, during a quarrel after her announcement that she was jilting him, he struck her, feeling the impulse to kill her. With exacerbated feelings of guilt he went weeping to a police station to surrender himself. Told by the police to go home, he proceeded to a public house where he had beer and whisky. Later that night he returned home and made a determined attempt to gas himself.

Case 92.—A railway fireman aged 27. An impulsive, quick-tempered man whose marriage had been marred by much quarrelling between himself and his wife. She had left him to return to her mother a fortnight previously. He became then depressed in his spirits, lost appetite, could not concentrate on his work and slept badly. "To pass the time" he began to drink each night. On the morning of his suicidal attempt, unable to sleep after a night shift, he went for a walk, took whisky and beer in a public house at midday, and in the early afternoon returned home to write a farewell note to his wife and to attempt to gas himself. There was some evidence however that he expected he would be interrupted.

Both psychopaths in this group were men. One claimed that he took alcohol on the night of his suicidal attempt, deliberately to ease the commission of his act, the precise determinants of which are unknown. The other, refused money by his adoptive father, got drunk and after leaving a farewell note upbraiding his father, slashed his wrist.

In one instance alcohol helped to release a dangerously aggressive impulse in an unstable personality, who on other counts at the time would not have been considered ill.

Case 147. A miner aged 31. His father was alcoholic and the home much disturbed by this and the consequent parental quarrelling. He grew up hating his father: and was at his father's complaint committed to an approved school at the age of 14 for a theft of money from his home. At the age of 20 he was invalided from the Army with neurosis. Later, he served a short term of imprisonment for another theft. He has been a shy, impulsive individual, prone to depressive moods and feelings of inner restlessness: but since his marriage six years ago his adjustment has been reasonably satisfactory. Getting into arrears with hire-purchase payments, he found his wages arrested, on his birthday. Later that day he went to a public house, drank 8 pints of beer, and returned home, as he described it, "big with drink": whereupon, feeling fed-up and resentful, he swallowed on an impulse 100 tablets of a sulphonamide drug. There was no loss of consciousness. He said afterwards, "I wasn't caring at the time: at the same time I wouldn't say I wanted to die." A social worker was able to help to disentangle the financial situation, and no psychiatric treatment was required.

Discussion

Those who study the importance of alcoholism in the genesis of suicidal acts are likely to report results varying according to the time and the locality of their investigations. What is found to be true of an urban population in Scotland now, may not apply elsewhere nor be true a decade hence.

With the exception of the case of the individual who essays his confused exit in a state of delirium tremens, it is rarely possible to attribute a suicidal attempt wholly or even mainly to the influence of alcohol. The chief types of people who make suicidal attempts under the influence of alcohol—those suffering from psychopathic and depressive states, are those who more often make their attempts without its influence. Both alcoholism and suicide have deeper, often apparently identical, bases in personality disorders and situations of severe maladjustment.

Nevertheless alcoholism plays a significant role in the genesis of many suicidal acts. Alcoholism in first-degree relatives, particularly in the parents, has often disrupted the childhood home of those who later become suicidal: and it is probable that in many of these cases it has contributed significantly to the personality distortions of which suicide may be the outcome. While stressing this environmental effect one also recognizes that, though they are not themselves heritable, both alcoholism and suicide may be at least in part in some cases the expression of inherited morbid tendencies.

In the adult, alcoholism may prepare the way for suicide by hastening personal disintegration, material ruin and social estrangement. Also, under the disinhibiting influence of alcohol repressed drives are released and suicidal attempts may be made, which perhaps might not have originated had not aggression been thus released, fears numbed and perspectives blurred. It is unusual for there to be a true amnesia for a suicidal attempt made under the influence of alcohol; which is what one would expect, since enough alcohol must have been taken to produce disinhibition but not enough to cause insensibility.

While alcohol facilitates a number of suicidal attempts, it may render them less effective by making the individual less competent in his performance (more rarely probably, the incompetence may result in worse injury). It may also hold suicidal impulses in check, preventing the irruption into clear consciousness of painful conflicts and the more dramatic acting-out of the destructive trends of which it is itself an expression. The frightened and perplexed individual with feelings of hopelessness may fly to alcohol from the grief or demands of an intolerable situation, and find sufficient solace in the forgetfulness it produces. An alcoholic bout can in these circumstances substitute for suicide. But for the individual with a severe personality disorder, alcoholism may be an effective compromise only so long as it is steadily maintained. Almost one-half of those in this series who abused alcohol repeatedly, were not under its influence at the times of their suicidal attempts: and suicide is not a common feature of "chronic alcoholism", since the persistent drinker follows a less urgent course of self-destruction unless he is overwhelmed by an unusual access of depression or abandons his habitual consolation. The wholly unsatisfactory nature of this alcoholic compromise frequently justifies the use of the term "chronic suicide".

That the individual has been drunk at the time of his suicidal attempt, usually makes his act more difficult to assess. But because he has been drunk, it should certainly not be readily assumed that he has not been in earnest. Many such attempts are dangerous. Each case, after detailed investigation, should be judged on its merits.

There is no such entity as "The alcoholic suicide". Between the ruined habitual drunkard who attempts to end his life, and the previously stable man, overwhelmed by some recent tragedy, who seeks first by alcohol and then by suicide to abolish his distress, there is obviously a wide difference. But it does not seem very profitable to try to make a neat distinction between suicidal alcoholic patients on the one hand and alcoholic suicidal patients on the other. There are no firm boundaries between these groups. The intensity of the suicidal drive, the degree and duration of the dependence on alcohol, the underlying personality structure, the present reaction type, and the environmental circumstances—these are the main criteria upon which therapy and prognosis must be based.

In this presentation of some of the clinical features of the cases, the wider social aspects have been largely neglected. This has not been done in denial of their importance. It is evident rather that these suicidal attempts had been the maladaptive issues of conflicts between individuals and their environments, and that their explanation may lie in defects of nature or of nurture or of both. Here the explicit emphasis has been upon the individual's failure to meet the challenges of his environment in a healthy way. But the cultural setting of suicidal attempts deserves equal consideration: and the culture cannot be exculpated. Alcoholism and suicide may both be indices of social disorganization. The explanation of a state of human dissatisfaction may lie simply in the starvation of essential emotional needs, and whether alcoholism and suicide be considered as attempts to find nirvana or to escape misery, both reactions may be held to imply a criticism of the society which has failed to sustain some of its members.

SUMMARY

The literature of the relationship of alcoholism and suicide is reviewed, and the need for further studies demonstrated.

Two hundred consecutive cases of attempted suicide admitted to a general hospital have been examined personally.

A family history of alcoholism in first-degree relatives was found in 28·5 per cent. Many of the subjects came from homes "broken" by parental alcoholism.

19·5 per cent. of the cases were under the influence of alcohol at the time of their suicidal attempt.

Forty-three (21·5 per cent.) of the cases gave a personal history of excessive drinking. The sex, ages, marital state, social class, previous adjustments and reaction-types of these individuals are detailed. Their suicidal attempts are discussed in relation to their mode, timing, accompanying insobriety, precipitants, seriousness, subsequent loss of consciousness or amnesia, and their psychopathology.

A further 16 (8 per cent.) individuals who were under the influence of alcohol at the time of their suicidal attempts, were not pathological drinkers. The role of alcohol in determining these attempts is illustrated.

The following are among the conclusions reached:

(*a*) Though rarely wholly or mainly the cause of a suicidal attempt, alcoholism is a significant factor in about 30 per cent. of these acts, and in men about twice as often as in women.
(*b*) Parental alcoholism disrupting the home, may contribute to the personality disorders which result in suicide.
(*c*) Alcoholism and suicide have frequently similar or identical psychopathological bases. Alcoholism may be a fractional suicide, prepare the way for suicide, or provide a substitute.
(*d*) Alcoholism may facilitate a suicidal attempt by releasing inhibitions: and it may also render it less effective. Such attempts, though often impulsive, are often also serious.
(*e*) A relatively small amount of alcohol is more potent in this than a large excess.
(*f*) The "chronic alcoholic" does not typically commit suicide. Sufferers from psychopathic and depressive states who repeatedly abuse alcohol, frequently attempt or commit suicide: the intermittency of their drinking may expose them more to the stress of intolerable conflicts.

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SOME FACTORS AFFECTING REACTION TIMES TO AUDITORY STIMULI IN MENTAL PATIENTS

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A NUMBER of studies on reaction time (R.T.) latency to visual and auditory stimuli in psychotic patients has been reported since the first investigations on the personal equation were carried out. The general trends from the work up to 1943 are well summarized by Hunt (1944), while Granger's (1953) review of "Personality and visual perception" contains a summary of the studies on R.T. to visual stimuli.

Certain fairly consistent findings emerge from the work on psychotics and we shall recapitulate these briefly before examining a few of the specific findings in more detail. Manic-depressives, in excited phase, tend to be slower than normals but quicker than manic-depressives in depression (Franz (1906), Wells and Kelley (1922), Lundholm (1922)). Both manic and depressive patients tend to show a greater intra-individual variability than the normal, while slowness of response has been found associated with: (1) clinically judged severity of disorder in manic-depressives tested repeatedly, (2) relative severity in different individuals tested once.

The early evidence on R.T. latency in schizophrenics is somewhat uncertain. Wells and Kelley (op. cit.) found that 5 dementia praecox patients, with no intellectual deterioration, were nearer the normal than any other psychotic group. They also reported an interesting discrepancy in these patients in that they showed a smaller ratio between visual and auditory R.T.s than either the manic-depressives or normals. This could mean that some schizophrenics tend to react relatively more quickly to light than to sound (a reversal of the normal R.T. findings), but it could equally be due to some other uncontrolled factor, such as the slower warming-up of some schizophrenics or, conversely, to a fatigue effect. Saunders and Isaacs (1929), using a visual target task rather different from the standard R.T. arrangement, came to the largely negative conclusion that their psychotic group consisting of 14 schizophrenics and 9 manic-depressives differed little from a normal group except in the number of anticipatory responses given by the former.

More recent work using variations of the R.T. procedure such as altering the regularity or irregularity of preparatory interval as well as its duration, has demonstrated that schizophrenics differ markedly from normals in their degree of preparedness and ability to maintain a "set". Huston, Shakow and Riggs (1937) found that, in general, their 38 schizophrenics had slower and more variable R.T.s than 25 normals, and, when the length of time between a preparatory signal and the actual occurrence of the stimulus was varied, the difference between the schizophrenics and the normals tended to increase. Following this up, Rodnick and Shakow (1940) used an extended range of preparatory intervals (from 1 to 25 seconds), and found the difference between schizophrenic and normal tended to widen the longer the preparatory interval used. From this finding, they were able to construct a composite "set index" that discriminated between their schizophrenics and controls without overlap, even though the latter had been selected for their low intelligence and poor motivation. Finally, Huston and Senf (1952), using similar procedures, compared the R.T.s of two groups of schizophrenics, one chronic, the other acute, with those of a manic-depressive depressive group and a neurotic group. They found the chronic group to be significantly slower and more variable than the other 3 groups, while the neurotic group was significantly quicker, the depressives tending to fall between the chronic and the early schizophrenics. The general conclusion from this work would seem to be that the degree of impairment of "attention" or "mental set" to be found in schizophrenic groups is both a function of the phase and duration of the illness, and also, to some extent, of the estimates of co-operativeness or non-co-operativeness that investigators make in deciding whether or not to include certain patients' results.

While the possible diagnostic value of some forms of R.T. task has been well demonstrated for schizophrenics in relation to normals by these studies of Huston *et al.* and Rodnick and Shakow (op. cit.), most of the clinical implications of the R.T. findings still remain to be adequately worked out on an experimental basis. Scripture (1916), having studied speed and pattern of response to simple and complex stimuli in 6 normals, 3 alcoholics, 3 hysterics, 3 epileptics and 2 paretics, affirmed his belief that ". . . the reaction test can be made so complete and reliable that a diagnosis of epilepsy, hysteria, general paralysis, etc., can be obtained as surely and accurately as one of diabetes or chronic nephritis from a urinary analysis" (p. 719). Such a belief was scarcely warranted by his own results, but, on the other hand, the scepticism of Saunders and Isaacs (op. cit.) as a result of their largely negative findings is equally unjustified.

There are several possible reasons for the occasional discrepancies in the early findings and for the consequent uncertainty regarding the value of R.T. tasks in general. These are as follows:

(1) In many early investigations, the actual experimental procedure, form of instructions, etc., is often not clearly described so that some of the result variations may be due to procedural and methodological factors not apparent from the text.

(2) Small numbers of cases are often used and adequate control of sex and age differences is rarely made, while statistical evaluation of results is usually inadequate.

Since the early investigations, a number of studies on normals has demonstrated clearly the influence of sex and age as general factors in R.T. latency. Bellis (1933) measured R.T. to light and sound in 150 normal male and female subjects from age 4 to 60. Optimal R.T. is reached between 21 and 30 and then shows progressive decline, while the male subjects tend to be quicker throughout the age range. Forbes (1945) confirmed the effect of age on R.T. to sound in 178 male subjects aged 17 to 53 but could not demonstrate it on R.T. to light. Obrist (1953) has recently studied R.T. in normal males aged 65 to 86 and reported the greater inter-individual scatter of the older subjects. Evidence on both the age and sex factors in normals is sufficient to necessitate careful control of these factors in any investigation on R.T. latency in clinical states. Evidence concerning the relation of R.T. to intelligence shows mainly some low positive correlations (Henmon and Wells (1914), Lemmon (1927)), and it is doubtful whether, within at any rate the normal range of intelligence, this is a factor of any importance except in so far as both types of test may have some common measure of "keenness" or of temperamental type.

In the present investigation, which is the first of a series of experimental studies planned to investigate systematically R.T. and its conditions of variation in simple and complex tasks, we have set out to study primarily R.T. latency in neurotics, depressives and schizophrenics together with the general effects of age and sex in these groups.

METHOD OF INVESTIGATION

The investigation has been designed so that 3 major probable sources of variations could be studied under controlled conditions, these being age, sex and clinical category. A fourth possible source of variation, intelligence level, was not specifically investigated because, as already indicated, the complexity of that problem would require a special investigation. Only a "check" study of high and low I.Q. patients was carried out, with negative results.

The general design consisted of using a normal control group with an equal number of male and female subjects, and 3 main clinical groups—neurotics, depressives and schizophrenics. The neurotics and depressives (equal numbers of male and female patients) were subdivided into 2 matched age groups of under 40 and over 40 years. Having found that the results obtained on our normal group corresponded closely to the typical values for R.T. to sound as quoted by Woodworth (1938) from a number of investigations, it was considered that no over 40-year normal age group was necessary, the effect of normal ageing on the simple R.T. being well established (Miles (1933); Bellis, Obrist, op. cit.). Only schizophrenics of comparatively recent onset were investigated and age differentiation was not made for this group, while the sex difference turned out to be non-significant for this category so that equal numbers of males and females were not required for comparison. Details of the groups studied are shown in Table I.

TABLE I

Groups Investigated

		Male			Female		
Category	Total No. of Cases	No. of Cases	Mean Age	S.D.	No. of Cases	Mean Age	S.D.
Normal	20	10	31·2	13·7	10	25·7	3·8
Schizophrenic ..	25	15	22·7	4·84	10	26·8	6·23
Neurotic <40 ..	20	10	28·4	3·88	10	30·0	4·27
Neurotic 40+ ..	20	10	49·6	7·1	10	50·9	8·69
Depressive <40	20	10	28·8	6·51	10	27·7	4·63
Depressive 40+	20	10	53·9	8·55	10	52·5	8·68

The patients studied in the clinical groups were all admissions to the acute psychiatric unit, Barrow Hospital, and to the attached Neurosis Unit. Those classed as neurotic were chiefly anxiety states. The depressive groups included both those considered primarily endogenous and those primarily reactive. The schizophrenic group consisted of patients, the duration of whose illness ranged from a maximum of 2 years to a minimum of a few weeks prior to first admission, but did not include any of the paranoid subtype.

EXPERIMENTAL TESTS

The tests consisted of response to an auditory stimulus made by the experimenter tapping once on a morse key. This action completed a circuit to a standard chronotron which was broken by the response of the subject on a second morse key. The experimenter was screened from the subject by the chronotron.

Four series of 10 reactions each were made for each subject, after preliminary practice trials were given:

Series 1: Simple reaction time (1).

Instructions: "I want you to press down on this key (demonstrating) as quickly as you can immediately you hear me make this sound (demonstrating). I shall do this several times, first for practice, and then to see how quick you are to respond."

The experimenter then carried on with this procedure, allowing approximately 5 seconds to elapse between each response by the subject and the subsequent auditory stimulus, the time for each response latency being recorded in milliseconds (m/s).

Series 2: Delayed reaction time.

Instructions: "I want you to do exactly the same now as previously, but this time I am going to give you a warning word 'Ready' 10 seconds before I actually make the sound. I only want you to press down on your key when you hear the sound. This is how it will be (demonstrating 10 seconds delay period, etc.)."

Series 3: Varied delay reaction time.

Instructions: "This time I am again going to give you a 'Ready' warning, but you will not know how long a time there will be between the warning and the actual sound to which I want you to respond. It may be only 1 second or it may be as much as 15 seconds, but each time as soon as I say 'Ready' I want you to prepare at once to press down on your key when you hear the sound."

The following fore-period times (in seconds) were given always in the same order for each subject: 2, 8, 5, 10, 15, 1, 12, 6, 4, 3.

Series 4: Simple reaction time (2).

Exactly the same procedure as for series 1. This second series was used as a check on possible fatigue or practice effects.

In all, 40 observations were made on each subject, exclusive of any practice series. The instructions and procedure for each series have been stated in detail so that the results may be reproducible in other investigations.

RESULTS

I—Inter-group comparison

The results obtained from the normal and clinical groups on the 4 test series are shown in Table II, the means and S.D.s being expressed in milliseconds.

From inspection of the table, certain trends in the results are directly apparent. These are as follows:

(1) The normal means are lower than those of any clinical group, although only slightly lower than the <40 neurotics.

(2) The schizophrenics are at the other extreme from the normal, their means being longer even than those of the 40+ depressives.

(3) Comparison of the <40 neurotics and depressives with the 40+ groups shows the former to be, on the average, quicker in response than the latter.

(4) Comparison of the results for the male and female groups, normal and clinical, shows a tendency for the males to respond quicker in all groups except the schizophrenics.

The significance of these trends and the possible interactions of the various factors has been tested by means of analysis of variance, using as data for the analysis the total scores for each individual summed across the 4 experimental series. The analysis has, for convenience, been made in three parts, the first of which is summarized in Table III where the results for the normal groups, the <40 neurotic groups and the <40 depressive groups, have been compared in terms of sex and clinical category difference.

TABLE II

Mean R.T.s (in milliseconds) for Normal and Clinical Groups

Age Group	Category		Sex	No. of Cases	Series 1 Simple (1)		Series 2 10 seconds delay		Series 3 Varied delay		Series 4 Simple (2)	
					Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
	Normals	1	M	10	174	54·8	177	57·2	193	23·1	160	27·6
		2	F	10	185	30·8	194	31·5	227	43·6	186	30·3
	Schizophrenics	3	M	15	535	293·1	411	218·4	382	176·2	419	180·3
		4	F	10	334	140·5	362	181·8	349	154·4	355	179·5
<40	Neurotics	5	M	10	188	42·29	180	29·3	205	29·82	180	29·17
		6	F	10	245	53·4	237	53·03	253	40·74	232	38·29
	Depressions	7	M	10	227	79·43	177	38·99	223	41·21	209	56·67
		8	F	10	227	69·77	223	86·84	226	86·67	203	86·02
40+	Neurotics	9	M	10	229	119·8	213	105·2	232	138·1	217	134·5
		10	F	10	271	81·12	273	47·62	295	55·8	293	106·9
	Depressions	11	M	10	314	179·4	304	207·7	308	184·1	334	221·6
		12	F	10	283	166·9	336	178·4	362	200·3	319	178·0

TABLE III

Summary of analysis of variance in terms of sex and clinical category for the normal groups, and the <40 neurotics and depressives (Groups 1, 2, 5, 6, 7 and 8 in Table II)

Category	Source of Variation	df.	F.	P.
All groups	Between sexes : within groups	1 : 58	12·9	<·001
1. Normal	,, ,, : ,, ,,	1 : 18	15·9	<·001
2. Neurotics <40	,, ,, : ,, ,,	1 : 18	14·1	>·001
3. Depressives <40	,, ,, : ,, ,,	1 : 18	0	—
All groups	Between 1, 2 and 3 (normals, neurotics <40, depressives <40) : within groups	2 : 57	3·0	>·05
	Between 1, 2 and 3 :			
	(I) within normal	2 : 19	6·1	<·01
	(II) within neurotics	2 : 19	3·4	>·05
	(III) within depressive	2 : 19	1·3	>·20

The overall sex difference, which is highly significant, appears from further analysis to be greatest in the normals, slightly less marked in the neurotics and not significant in the depressives. The within-group variation in the depressives is such that the sex difference is taken up altogether. With regard to the lower part of the table where the differences as between the normal, neurotic and depressive categories are analysed, it will be seen that the overall between-group variation is not significantly greater, at the ·05 level of confidence, than the within-group variation. When further analysis is carried out, however, it can be seen that the normal within-group variation is much less than the between-group (being significant at the ·01 level), the neurotic variation is not quite significantly less, while the depressive within-group variation is almost as great as that between the groups themselves. This progressive within-group variation from normals through neurotics to depressives is, of course, a not unexpected finding, but an analysis of this kind has the useful function of bringing out clearly the relative consistency and stability of the normals as a group in contrast to the very great within-group variation of the depressives.

The second part of the analysis is summarized in Table IV in which the relative effects of age, sex and clinical syndrome as between all the neurotic groups and all the depressive groups are examined.

TABLE IV

Summary of analysis of variance in terms of sex, age and neurotic-depressive category (Groups 5, 6, 9, 10 and 7, 8, 11, 12 in Table II)

Variable	Source of Variation	df.	F.	P.
1. Age	Between groups	1		
	Within <40	38	33·3	<·001
	Within 40+	38	4·3	<·05
	Between groups	1		
2. Sex	Within <40	38	11·37	<·01
	Within 40+	38	1·32	>·1
	Between groups	1		
3. Clinical Category	Within <40	38	7·68	<·01
	Within 40+	38	1·04	>·1

From this table, it will be seen that, of the 3 main variables, age shows the most significant difference. As was to be expected from previous work on normals, patients of the neurotic and depressive groups below age 40 are significantly quicker in response than those of 40 and over. The interaction effects bring out this finding in greater detail, showing, for example, that the age factor is specially important in the depressive category, in which it appears that the under 40 depressives are considerably more consistent, as a group, than the 40+ patients of this category (F=23·6, for which P=< ·001). This tendency is much less pronounced in the neurotic category, even though the differences between the means for the under 40's and 40+s show a lengthening of R.T. in the older group. This finding can therefore be summarized as showing that it is the greater inconsistency of the older depressives, particularly the female patients, that chiefly differentiates the groups. A further implication of the analysis would seem to be that age tends to *widen* the discrepancy in R.T. between neurotics and depressives, as is indicated by the fact that the variation between neurotics <40 and neurotics 40+ is significantly greater at the ·01 probability level than the variation within neurotics <40, whereas a comparison for the depressive age groups gives a difference significant at the ·001 level. This finding might suggest that the slower responsiveness and the greater inter-individual variation in the 40+ depressives as compared with neurotics of the same age group could be due to the greater degree of relative habituation to be found at least in certain of the recurrent depressive states.

A subsidiary finding with regard to the interaction effects of age, sex and neurotic-depressive category is that, in comparing the 40-59 year old male patients (N=14) with the 60+ male patients (N=16), the two groups differ highly significantly with respect to stability (consistency), although their means show very little difference. There is, in fact, far less within-group, i.e. inter-individual, variability in the 60+ group than in the 40-59 group (within-group 60+ : F=54·8, P=< ·001; within-group 40-59 : F=1·7). A finding of this kind, as between groups in whom various forms of neurotic and depressive reaction are included possibly unequally, must be treated with great caution and be carefully verified with due regard to possible sampling, "selective" errors, etc. With regard to the sex differences as between neurotics and depressives, we have already noted from the analysis of Table III that the male neurotics <40 are significantly quicker than the females of the same age and clinical category, whereas no such sex difference is apparent in the depressives. So also from Table IV, it appears that the sex difference which exists between groups under 40 is no longer significant in the over 40 patients owing to the greater within-group variability of the latter. A similar finding is made as to the differences between neurotics and depressives, the within-group variability of the 40+ patients being so great that the difference is significant only for the under 40s.

The third part of the between-group analysis deals with the data for the 25 schizophrenics. A summary of analysis of variance, using total scores for the 4 series, of the differences between the schizophrenics, the neurotics <40 and the depressives <40 is given in Table V.

TABLE V

Significance of differences between schizophrenics, neurotics and depressives <40

Source of Variation	df.	F.	P.
Between groups	1		
Within neurotics	19	158·5	<·001
Within depressives	19	62·1	<·001
Within schizophrenics	24	7·54	<·01

This analysis shows highly significant between-group differences, the schizophrenics being by far the least consistent and having longest R.T.s. The lack of overlap between the schizophrenics and the other groups is particularly marked in the male patients, where 11 out of 15 of the schizophrenics are outside the range of all other groups, including the depressive, while there is an overlap of only two as between schizophrenics, and neurotics and normals.

Amongst the female patients, the inter-group differences are less clear-cut. Although 7 out of the 10 schizophrenics are outside the normal range, only 3 out of 10 are outside the neurotic range. As between the sexes, the female schizophrenics show a tendency to reverse the normal relationship, being rather quicker than the males of the same clinical category.

The extent of the R.T. latency found in many of the schizophrenics is paralleled only by that shown in certain patients following upon the standard pre-frontal leucotomy operation. Results of testing 9 patients between 10 and 14 days after operation show 5 out of the 9 to have total scores of 2,000 m/s or greater—almost 3 times longer than the average total R.T.s for normals and neurotics. The schizophrenics and post-leucotomy cases thus both may show a very considerable receptor-effector inertia, but it is probable, as will appear from results given in the next section, that some, at least, of the schizophrenics may be induced to respond much quicker by experimental variation of conditions.

A summary of the inter-group results described in this section is shown in histogram form in Fig. 1.

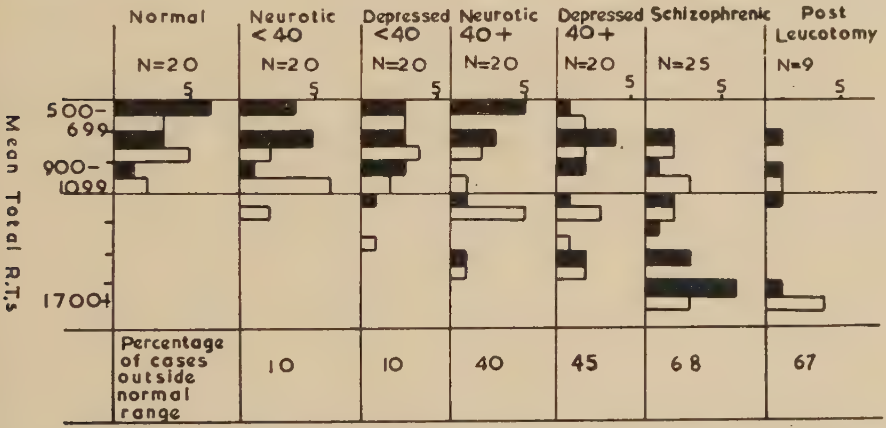

FIG. 1.—Histograms showing distributions of mean total R.T.s for all groups, and the percentage of cases in each group falling outside normal range (black columns represent male, unshaded columns female subjects).

The general conclusions to be drawn from these results and their statistical analysis seem to be that:

(1) Age is the most important factor accounting for the variation between groups, the within-group variability of the 40+ groups being so great as to level off the sex and clinical differences observed in the <40 groups.

(2) Sex is a significant factor in the variation of normals and neurotics <40, but not in the 40+ neurotics and depressives nor in the <40 depressives.

(3) Normals are more consistent and quicker in response than neurotics and neurotics than depressives, in the <40 range, and the difference between neurotics and depressives is accentuated in the 40+ range.

(4) The schizophrenics have longer R.T.s than any other group, including the 40+ depressives.

II—Inter-series and Intra-individual Variation

(1) *Inter-series variation*

In addition to the between-group differences noted above, certain subsidiary findings as between the 4 experimental series or conditions are at least suggestive for further investigation. The "normal" pattern, as between the 4 series, is for the R.T.s under the condition of varied delay (Series 3) to be longer than those for Series 1, 2 and 4 which scarcely differ at all from each other. A similar pattern is found in the male and female neurotics <40, but the male schizophrenics show the opposite tendency, as is shown in Table VI where the mean R.T.s in m/s are given, their R.T.s for the simple conditions being longer than those for the delay and varied delay procedures.

TABLE VI

Mean R.T.s for the 4 experimental series for normals, neurotics <40 and male schizophrenics

Group	Series 1 Simple	Series 2 10 seconds delay	Series 3 Varied delay	Series 4 Simple
Normals (N=20)	180	181	210	173
Neurotics <40 (N=20)	217	209	229	206
Schizophrenics (Male, N=15)	535	411	382	419

Seven out of the 15 male schizophrenics show this reverse pattern very markedly, the means for the Series 1 and 4 being considerably greater than those for Series 2 and 3, as is shown in Table VII.

TABLE VII

Mean R.T.s for series 1 and 4 combined compared with series 2 and 3 combined for 7 male schizophrenics

Patient	1	2	3	4	5	6	7
Mean Series 1 and 4 ..	446	337	566	691	504	747	877
Mean Series 2 and 3 ..	281	245	343	425	272	455	664

Although this pattern is not exclusive to the male schizophrenics, occurring also in 2 female schizophrenics and, fairly markedly, in 3 depressives, the extent of the improvement shown by these 7 patients under the conditions of delay and varied delay is striking. In considering this finding, it is important to make clear its possible implications and the reasons for its occurrence. Under the simple conditions of Series 1 and 4, the patient can be described as having to initiate his own "mental set" or "preparedness" to respond to a sequence of stimuli. He is given no preparatory signal, but it is inherent in the procedure under these conditions that the actual signal is given with regularity. By contrast, under the conditions of delay and varied delay (Series 2 and 3), the experimenter always precedes the actual signal by a verbal cue "Ready". It would seem, therefore, that these patients are able to "get set" much better under conditions of verbal preparation, even where the length of the foreperiod is unknown and irregular, than where they only have the general signal contained in the preliminary instructions.

(2) *Intra-individual Variation*

We have seen from the results of the inter-group comparisons that the patient groups show considerable within-group variation, although neurotics and depressives tend to overlap in varying proportions with the normals. The problem of variation was further investigated by examining the actual variation within the individual's reactions for each of the 4 series, this being expressed as the coefficient of variation (C)=standard deviation×100÷mean. The mean values of C for the normal, neurotic and depressive groups are given for the 4 series in Table VIII.

TABLE VIII

Intra-individual variation (Mean values of C) for normals, neurotics and depressives

Group	Sex	Age	Series 1 Simple	Series 2 10 seconds delay	Series 3 Varied delay	Series 4 Simple
1. Normal	M		15·47	13·49	17·19	11·66
2. ,,	F		16·30	12·29	24·98	16·49
3. Neurotic	M	<40	20·53	13·99	29·05	20·64
4. ,,	F		28·12	22·12	27·38	23·99
5. Depressive	M	<40	26·04	13·66	36·97	22·63
6. ,,	F		17·60	20·51	36·74	28·84
7. Neurotic	M	40+	20·50	13·18	18·29	19·78
8. ,,	F		22·78	23·21	32·18	22·21
9. Depressive	M	40+	23·64	20·82	22·38	23·97
10. ,,	F		22·72	19·94	27·44	24·85

Analysis of the variance as between sexes and category for the 4 conditions brings out very clearly certain factors that are suggested by inspection of Table VIII. These are summarized in Table IX below, where the data are analysed particularly with reference to:

(*a*) The overall sex difference in terms of variability.

(*b*) The significance of the observed trend for male patients to be much more consistent than females under the Series 2 condition of 10 seconds delay.

Only the significant findings are shown.

TABLE IX

Summary of analysis of variance of C data of Table VIII

Source of Variation	df.	F.	P.
Between conditions	3		
Within conditions	391	8·70	<·001
Between sexes	1		
Within sexes	393	6·70	<·01
Interactions			
1. Condition and sex: Series 2 (delay)			
Between sexes	1		
Within male	49	11·83	>·001
2. Male: Condition and clinical category			
Neurotic <40			
Between conditions	3		
Within Series 2	9	12·85	>·001
3. Female: Condition and clinical category			
Normal			
Between conditions	3		
Within Series 2	9	38·39	<·001
Depressive <40			
Between conditions	3		
Within Series 2	9	5·03	>·01

In terms of intra-individual variation, it is clear from the statistical analysis that there is a highly significant difference as between the 4 experimental conditions of Series 1-4, the greatest within-series variation occurring, as was to be expected, under the condition of varied delay (Series 3). The difference between the sexes is also significant which is only an elaboration of the inter-group comparison finding where the total mean scores were used as data. When we come to a further analysis of the interaction effects, these appear chiefly of interest in demonstrating certain consistency trends. For example, the males are seen to be far more consistent than the females under the condition of a fixed 10 seconds delay (Series 2), this relative tendency being mainly apparent in the <40 neurotics and depressives. In the clinical groups also, it seems of possible interest that, in the neurotics, the relative consistency of R.T. is so significant under this condition. The implication of this finding is probably that emotionally disturbed patients are able to perform with relative consistency when the objective frame of reference of the actual stimuli is fixed and invariable.

III—Test-retest Change in Schizophrenia and Depression

A number of patients of both sexes, classed as schizophrenic or depressive, were retested, using the same procedure, at various stages in the course of their illness. Re-testing was always carried out at the same time of day as the initial test in order to control possible diurnal variation. Significance of the difference between means from test to test was assessed statistically for each patient, and a psychiatric estimate of the clinical state of the patient, in terms of improved, not improved and unchanged was made on the same day the test was performed.

In general, it was found that those patients whose initial R.T.s were longer than normal, and who subsequently improved clinically, showed a significant

TABLE X

Test-retest results in relation to clinical estimate for six patients

Sex, age and clinical category of patient	Initial Mean R.T.	Diff. R.T. test 1 and 2	Clinical estimate at 2	Diff. R.T. test 2 and 3	Clinical estimate at 3	Diff. R.T. test 3 and 4	Clinical estimate at 4
1. F 54 Involutional depression ..	297	0	0	+	+	0	U
2. F 46 Recurrent depression ..	357	0	0	+	+		
3. M 18 Recent schizophrenia	860	+	+	+	U	0	U
4. M 20 Recent schizophrenia	337	0	0	0	0	0	0
5. M 53 Manic-depressive depression ..	166	0	0	0	0		
6. M 58 Manic-depressive depression ..	366	0	0	0	0		

+ = significant shortening of R.T. and clinical improvement.
O = no significant shortening of R.T. and no clinical improvement.
U = remained clinically improved.

quickening of R.T. on later tests. In patients who showed no clinical improvement, the R.T.s either did not change significantly or else became longer than on the first test. Table X summarizes the results for 6 patients who showed this relationship, using only the means for the simple conditions 1 and 4 as the delay conditions varied in the same direction in these cases.

This relationship trend was not apparent in all cases, improvement in R.T.s sometimes seeming to precede overall clinical improvement, and, conversely, lengthening of R.T.s sometimes preceded clinical deterioration. The former was the case with a recent schizophrenic, aged 18, whose R.T.s under the two simple conditions (Series 1 and 4) were, on first testing, well outside normal limits, while her R.T.s for the delay conditions (Series 2 and 3) were within the normal range. On the 2nd and 3rd tests, her R.T.s for Series 1 and 4 improved considerably, although an estimate of clinical improvement was not made until test 4. It is probable here that the patient was showing a progressive ability to learn to respond more quickly which, in itself, might be a test indication of some prognostic value in this group of cases. Conversely, an extinction of responsiveness was observed in a young manic-depressive in normal phase prior to his relapse into depression.

Discussion

In the early work on R.T. latency in psychotics, age and sex factors were usually uncontrolled so that it was rarely clear from the stated results what contribution to the total variance was due to the psychosis. We have shown in the present investigation that age and sex are important sources of variation in the R.T. latency of neurotic and depressive patients, as well as of normal subjects. Controlling for such factors is an obvious step in any experimental design dealing with clinical groups, and their influence is probably general to a considerable number of objective, psychophysiological measures, such as response to pain (Hall and Stride (1954)), flicker-fusion (Misiak (1947)), and many other functions involving speed-relations in perceptual-motor tasks. Perhaps an important further step in investigations of this kind, as indicated by the present study, is to compare the interaction effects of age, sex and clinical syndrome, for example, the responsiveness of depressives of either sex at various age decades. As we have shown, there is some evidence of a relatively greater retardation in the older depressives than in comparable neurotic groups.

With regard to the specific comparison of our clinical groups, we have confirmed the previous findings of relative slowness of R.T. in depressive states, but our results have shown that the younger depressives, including those classed as of the endogenous type, differ very little from comparable neurotics and normals except in relative inconsistency. It seems clear from this finding that depression, as such, may not lead to long reaction time, but may do so only when it has become a more or less fixed response-habit over a number of years. This is shown also by the fact that many elderly patients, suffering from depression of recent onset—as, for example, many of the involutional cases—show an R.T. latency within normal limits. What appears, then, from our results to be the more complete picture of the R.T. latency in depression is as follows: in young depressives, there may be an oscillation in their level of response-efficiency shown by their relative inconsistency. In this, they overlap considerably with the young neurotics. This oscillation appears to become accentuated in the older depressives, and the individual range of response variation becomes much greater. It is possible that measures of R.T. consistency such as we have used may have some value for prognosis on the effects of E.C.T., as well as providing objective evidence of improvement or non-improvement as a result of treatment. The problem of R.T. deficit in depression is thus shown to be one of far greater complexity than the results of the earlier investigations had indicated.

In studying the R.T. latency of neurotics, it was not expected that differences from the normal would be at all marked, and the results for these groups were required chiefly for comparison with the psychotics. They differ from the normal only slightly in their inconsistency, and the R.T. results really provide simple measures of their ability to attend to a series of stimuli. These findings contribute little that was not obviously expected, and it is not suggested that tasks of this simplicity, unless accompanied by some form of experimental stress, have any diagnostic or general clinical value except in so far as they may measure consistency of attention.

In the previous work on schizophrenics, we have seen that there has been well-substantiated evidence of R.T. deficit, particularly on the more complex tasks involving choice and delay. However, with almost any type of psychological investigation on schizophrenics, there was conflicting evidence, on the one hand, of near-normality in simple R.T., and, on the other, of extreme non-normality, depending on the type of patient material tested and also on the type of experimental task, form of instructions given, and so on. Our results confirm the findings of Huston *et al.* and Rodnick and Shakow (op. cit.) with regard to the extent of the response deficit in some of these patients, but ours was probably a more homogeneous group of acute cases, excluding the paranoid subtype which Huston and Senf included, The relation of this result to the other investigations serves merely to emphasize the importance of taking into account the exact nature and history of the schizophrenic sample studied. We have ourselves found, contrary to Huston and Senf (op. cit.), that some chronic schizophrenics are able to give near-normal R.T.s and, as these authors have suggested, it is probably the interrelationships amongst several measures of the "primary" symptomatology that may be of greater interest.

The fact that some of our schizophrenic patients were able to respond much better under certain conditions of stimulation where a verbal preparatory signal was given, is suggestive for further experiments on the systematic variation of conditions of stimulus intensity, frequency, modality and form of instruction. We have seen that the inertia of some of these acute patients is as great as that produced temporarily by the pre-frontal leucotomy operation, but, whereas "organic" inertia is perhaps unlikely to be overcome except momentarily by varying the experimental conditions, it seems likely from our results that the schizophrenic inertia may, in some cases, be considerably reduced by such variation. The extent of the R.T. deficit in these cases suggests that these tasks may, as in the case of depressives, have value as objective measures of response efficiency before and after insulin treatment. It is possible also that those patients who improve most markedly in relative responsiveness under certain experimental conditions may have the best prognosis with regard to treatment.

From the clinical diagnostic and prognostic point of view, we may conclude that R.T. tasks such as we have used have value as simple measures of responsiveness in those forms of psychosis where apathy, inertia and retardation are common symptoms. For this type of case, they should provide useful objective evidence of one aspect of improvement resulting from treatment, and, in conjunction with other tests, they may eventually be found to provide prognostic criteria as to the effectiveness of treatment. Diagnostically, these tasks may have some value, in conjunction with other tests, in differentiating the early schizophrenic from the neurotic, and possibly in demonstrating the degree of unresponsiveness in various forms of depression. A primary task, however, that remains for the experimental psychologist is to investigate various patterns of responsiveness within individual patients and groups of patients—for example, reaction time, pain response, and conceptual level in schizophrenic patients are being currently studied. Obviously, the amount and type of information to be derived from reaction time studies will depend upon the complexity of both the stimulus and the response requirements of the tasks used. The use of choice and disjunctive R.T. procedures brings the required mental operation near to that of the standard conceptual and intellectual tests, and it should be of interest to investigate, with relatively complex R.T. tasks, the performance of organic cerebral disorders in order to compare their latency and consistency with that of the depressive and schizophrenic groups.

We can finally attempt briefly to interpret our findings with regard to depressive and schizophrenic R.T. deficit in general psychological terms. With regard to the retardation in depression, we have seen that it varies very considerably along the age scale, the relative degree of deficit seeming to be accentuated in the older patients. If we interpret this response inertia, as Davis (1952) has done, in terms of learning theory, we must suppose that the older patient's reduced responsiveness is analogous to that produced in the animal laboratory by experimental extinction and due to habituation. The relevance of such an analogue was put forward by Ivanov-Smolensky (1928) to explain the mechanisms of psychogenic or reactive depression. In his experiments on dogs, using a too-difficult discrimination problem, he was able to produce a gradually increasing degree of inhibition following an initial state of over-excitement, which resulted in the disappearance, first, of experimentally produced conditioned reflexes, then of natural conditioned reflexes (with respect to response to the aspect and odour of food), until finally the inhibition was said to irradiate over the whole cortex and down to the subcortical centres, so that the inborn, unconditioned food reflexes decreased. The essential features of such a progressive inhibition are the continued failure of reinforcement and the consequent generalization of inhibition over the hierarchy of learned, and finally of unlearned, responses. The degree of response inertia as measured by reaction time latency cannot, by itself, be taken as an index of the extent of internal inhibition. It is probable, however, that the parallel use of other psychophysiological response measures might produce a reliable sample of the degree of generalization of inhibition that had taken place in a particular patient. Hull's (1943) two-factor theory of inhibition seems to offer a quantitative basis for explaining the cumulative effects of recurrent depressive phases in reducing reaction potential, and this will be developed in a later paper in which further experiments on responsiveness in depression will be described.

In schizophrenics, one of the most important factors in determining objectively the extent of the generalization of their response inertia is their ability to learn to improve even on simple tasks such as those of reaction time. If inhibition is firmly established by chronicity or severity of illness, such learning will not be likely to take place. Hunt (op. cit.) has, in fact, offered an explanation of the slowness and excessive variability of schizophrenic R.T.s that is very similar to the one used to account for the slowness of depression. He describes their inertia as indicating a partial extinction of their responses to social stimuli, and he goes on to say: "Furthermore, the notion that extinction consists of substituting some other response for the one extinguished would allow for the incorporation of the clinically discerned preoccupations characteristic of schizophrenics into this interpretation, for instance, as substitute responses of an implicit sort" (p. 995).

Such similar mechanistic explanations for the observable response inertia in schizophrenic and depressive conditions are clearly much too simple and inadequate at present to account for the diversity of the clinical and experimental facts. It is true that the inertia and unresponsiveness of many apparently co-operative schizophrenics may be far greater than that even of elderly recurrent depressives. This might suggest that, in terms of a simple responsiveness dimension, the generalization of inhibition is much more extensive than is the case in depression.

Summary and Conclusions

1. The present investigation has been carried out as the first of a series of studies of the timing, latency and variability of relatively simple stimulus-response sequences in mental patients. The interest is not so much in average results as in the "oscillation of functional efficiency" as revealed by the intra-individual and inter-individual consistency or variability of reaction times shown throughout the whole of the experimental series. Reaction time procedures such as those used in the present instance, are akin to a conditioning procedure in so far as they involve a learning to "get set" and maintain the set to respond on presentation of a signal which precedes the actual auditory stimulus used.

2. Previous reaction time studies of psychotic conditions had shown some agreement as to the relative slowness of manic-depressives in depression and in excitement but, in studies of schizophrenic patients, some were reported to be near normal, while others were well outside normal limits particularly when the experimental procedures involved a relatively complex task. The early work often lacked control of relevant factors, such as age and sex, and statistical evaluation was inadequate.

3. This investigation has consisted of recording speed of reaction to an auditory stimulus in a control group of 20 normals, and in a psychiatric group of 105 patients, sub-divided into neurotic, depressive and schizophrenic categories. Four series of 10 reactions were obtained for each subject, two of the series involving warning signals preceding the actual stimulus.

4. The results showed, as was expected from previous work on normals, that age and sex must be carefully controlled in any investigation where the effect of clinical disorder upon R.T. is to be assessed. Contrary to the expectation derived from earlier work, depression, as such, may not lengthen R.T., because under 40 year old depressives do not differ, except in relative variability, from normals and neurotics of the same age group. Over 40 year old depressives differ very markedly from normal, and the relation of duration, or number of times of recurrence, of the depressive illness to degree of R.T. deficit requires further study. The schizophrenic group, of early acute cases, showed a very high degree of R.T. deficit—considerably greater than that of the over 40 depressives. As this was a relatively homogeneous group of cases, this finding does not controvert previous work, but emphasizes the invalidity of generalizations as to the nature of the R.T. deficit in schizophrenia. The neurotic group tended to show a greater variability than the normal, but otherwise their results were chiefly useful as reference figures with which to compare the psychotics.

5. Some reference was made to general psychological explanations of response inertia in depression and schizophrenia in terms of extent and degree of inhibition, on the analogy of animal conditioning experiments. It is concluded, however, that these explanations are, as they stand, much too vague to offer worthwhile hypotheses for detailed investigation of human clinical response phenomena.

6. From the clinical point of view, it is suggested that variability measures of response to stimulus sequences, such as were used in the present study, may be valuable as objective indicators of improving response efficiency and awareness resulting from treatment. Where such measures are taken in the context of other objective test findings, they may have some diagnostic value while the results on schizophrenics indicate a number of ways in which improved responsiveness may be experimentally induced in some cases, so that such inter-series "discrepancies" may have a possible prognostic value.

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PROGNOSIS IN INVOLUTIONAL DEPRESSION

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Depressive states occurring in the involutional period are among the most common syndromes encountered in psychiatric practice. Since the introduction of electroshock therapy, this has been the treatment of choice for these conditions. Unfortunately not every patient who is treated remains in good health, and every mental hospital has a certain number of chronic involutional depressions who remain refractory to further electroshock therapy.

This paper is devoted to a study of two groups of female patients suffering from involutional depressions who failed to benefit from electroshock therapy. In the first group of 39 patients the investigation was limited to the routine clinical examination customary in mental hospital practice. The second group consists of 8 patients who were studied intensively during their treatment by group psychotherapy conducted by two of the authors. The material produced by members of this second group provided the authors with an unusual opportunity of gaining insight into the psychological factors operating in the perpetuation of the illness. It seems reasonable to suppose that these factors are equally decisive for patients of the first group, but the methodology of the routine approach precludes the emergence of such information. It is just this information which is important in estimating the prognosis in involutional depression whether treated by electroshock therapy or not. The psychoanalytic theories of melancholia (Freud, 1917; Abraham, 1924) were used by the authors to further their insight into the prognosis of involutional depressions. Such insights are employed by many psychiatrists in their selection of patients for electroshock therapy, but a review of the literature reveals that little has been written on this aspect of the subject during the past decade.

The work is presented in three sections. The first is devoted to those patients examined by routine methods; the second deals with the information obtained from those studied during group therapy and the third section comprises a discussion. The patients have been studied with the aim of discovering, if possible, any factors which have contributed to the unfavourable outcome. It is hoped that the elucidation of these variables may assist in selecting cases for shock therapy with greater precision than has been possible previously.

Current Views on Prognosis

Many authorities have laid down criteria governing the outcome for involutional depressives who undergo electroshock therapy and they have specified the conditions which predispose to a poor result. Kalinowsky (1948) believes that in patients who fail to benefit paranoid trends are frequently encountered. He has noted that these patients have a poor emotional response, and neither a feeling of guilt nor a deep sense of hopelessness or self-condemnation. He remarks that they are more inclined to be resentful and to blame their unhappiness on others. Often such patients display hysterical or hypochondriacal tendencies.

Noyes (1948) states that "the more nearly the general manifestations of the disease approach those usually seen in the depressive phase of manic-depressive psychosis the better the prognosis. The greater the deterioration of personal habits, the more grotesque the delusions or the hypochondriacal ideas, the greater the occurrence of hallucinations, the more marked the poverty of thought and the tendency to aversion, the worse the prognosis." Henderson and Gillespie (1948) express views which are very similar to those of Noyes. Emphasis is laid on the preservation of the patient's affect and his capacity to make contact with the examiner. Hypochondria, excessive timidity and paranoid trends are of poor prognostic significance. Horowitz (1948) has observed that occasionally he had encountered a type of involutional melancholic who gave a history of a typical agitated, depressed state which had been present for six months to one year with an accompanying hypochondriasis. Treatment was rarely of any value.

The impression gained from reading such views is that prognosis tends to be based predominantly on the symptoms of which the patient complains and the impression which he makes upon his relatives and upon the examiner.

The Clinical Material—Group I

In this section of the paper an account is given of thirty-nine female patients suffering from involutional depression who had not responded to electroshock therapy. As stated in the introduction, these cases were investigated by routine clinical methods. Prognosis was estimated by a survey of environmental factors and of symptomatic state. The findings of this investigation are as follows. The average age of onset was just over 54 years, with variations in individual cases, between 38 and 75 years. The average age now is over 61 years, with limits of 46 and 78 years, and the average duration of illness, just over seven years. The number of electric shocks administered varied between 3 and 62, with an average per patient of approximately 15, administered at various times during the illness. Of the thirty-nine patients, twelve are married, eighteen are single and nine are widows.

Nine of the patients became ill without a known determining event. Of the remaining thirty, half became depressed immediately after the deaths of persons emotionally very important to them, such as parents, husbands, siblings or companions, or after a physical illness of the patient herself, such as influenza. The illness of the other half of the remainder was associated in its onset with the death of a close person, the loss of such a person by departure, or the threat of such loss by illness, or on physical illness of the patient, but these precipitants though existing cannot be averred with certainty. Thus possible precipitating factors are known in thirty out of thirty-nine cases.

Among the patients under review are five who suffered permanent mental incapacity from physical causes. These have been included intentionally since the effect of such incapacity is towards a lessening of emotional security and a diminution in the power to maintain necessary emotional attachments. The five cases suffer respectively from deafness, cerebral arteriosclerosis, subnormal intelligence (? birth injury), failing heart, and mild myxoedema. In a sense, these conditions might be described as possible precipitants of the depressive illness.

The criteria of case selection have not been rigid and the authors feel that the inclusion of five patients in the series who have had a previous single depressive illness between the ages of 23 and 33 in no way invalidates the conclusions. Not only do the present illnesses of these people closely resemble the patterns of illness of many of the others who have had no known previous depression, but, in addition, it would be unjustifiable to assume that, because the history of a previous attack is not recorded nor admitted, it did not in fact occur. Thus the authors feel that the homogeneity of the group is unaffected by the inclusion of these cases.

Thirty are hospital in-patients, nine are living outside the hospital. Twenty-seven have been ill for between one and twenty-two years, with an average of eight years, and have shown little or no response to electroshock therapy. The remaining twelve have been subject to relapses and it is clear from the histories that of these the majority have not really been well between exacerbations. The average time since the onset in the latter group is 5½ years.

As expected, various symptoms of depressive illness were shown by these patients, not only from case to case, but also by individual cases from time to time. They have therefore been classified with regard to the predominant type of symptom group apparent on consideration of the illness as a whole, and the descriptive terms used do not necessarily refer to the condition of the patient at the present time. Six categories were used (hypochondriacal, paranoid, retarded, deluded and hallucinated, agitated, with preserved affect). Those predominantly hypochondriacal, paranoid, retarded, and exhibiting fantastic delusions and hallucinations constituted, respectively 2, 3, 4, and 5 cases out of the 39. Twelve showed agitation as a predominant feature, and the remaining thirteen, though usually tense and anxious, had sufficient preservation of affect to allow reasonably good contact to be made with them. Their symptoms included anxiety, lack of confidence, difficulty in concentrating, poor sleep, headache, feelings of dullness, and irritability. It is significant to note that though the average time spent in hospital by the cases in this last group was less than a third of the time spent by the cases in the group described as predominantly agitated yet they had on average a slightly greater number of electrical shock treatments. In this connection it is worth adding that the total duration of hospitalization seems to vary directly with the number of electroshocks to which patients are subjected. Among the thirty-nine cases the average time of hospitalization for those who received up to twelve shocks (twenty-two cases) was two years five months, while those who had over twelve electroshocks (seventeen cases) were in hospital an average of three years five months.

A brief description of six cases typical of the group as a whole follows:

Case 1 (No. 10).—Single woman admitted 1949 at the age of 47 and in hospital since apart from two months unsuccessful trial at home in 1950. She never knew her parents and has no blood relations. Always self-effacing, hard-working, she had lived with a workmate for twenty years before the death of the latter just before onset of patient's illness. Her only interests were in her work at a thread mill and in her friend whom she tended faithfully and with self-sacrifice during her periodic illnesses. After friend's death, patient was dull, depressed, despairing, anxious and slightly self-reproachful. While in hospital, she has had six courses of electroshock therapy, totalling thirty-five shocks—each course followed by some improvement, then relapse. Has now become attached to another patient with similar symptoms, whom she admits stands in her mind for her dead friend. Patient often very worried by the fear that her new friend will die in the night and indeed frequently goes to her room in the mornings to enquire whether she is still alive. In the ward, patient is hard-working, self-effacing and friendly and only occasionally too depressed to be allowed ground parole or passes into the city. Contact is good and affect preserved.

Case 2 (No. 13).—Single woman admitted 1942 at the age of 58 and either in hospital or under constant surveillance as a member of the domestic staff since then. She was hard-working, self-effacing, and seems to have had no interests outside her work as a seamstress with the exception of a man of her own age to whom she was engaged between the ages of 30 and 38, during which time she indulged in mutual masturbation with him before he terminated their relationship. She was depressed for the first time when she was 47, for six months. From the age of 48 for ten years she and her ex-fiancé revived their old practices. When he broke off the liaison again, the patient became depressed, anxious, tearful, full of various somatic complaints, demanding attention and reassurance, and fearful of passing on "contagion". This state has continued with partial remissions since that time, some following short courses of electroshock therapy of which she has had 27 shocks in all, and some spontaneous. She is one of those described as having preservation of affect.

Case 3 (No. 16).—A widow admitted in 1946 at the age of 58 and continuously in hospital since then. She had no previous mental illness but is described as having been spoilt and over-protected all her life. Parents lived with her after her marriage, and both died when she was 52. Her husband was away from home in the forces from then till 1945 and patient became ill after his sudden death in 1946. She quickly became fearful, agitated, depressed, with nihilistic ideas, and negativism. Despite two courses of electroshock therapy, totalling 12 shocks, she remains tense, avers she is blind or dead. She has no useful activity, and is in constant agitation and fear. She is classed as "predominantly agitated".

Case 4 (No. 27).—A single woman admitted in 1951 at the age of 49 and in hospital since then apart from a few months' unsuccessful trial at home. She was shy and reserved and clearly attached to and dominated by an overpowering and rather unkind mother in whom she alone of the family could see no fault. She had a previous attack of mild depression for a year when she was 23, but was not then in a hospital. The present illness seems to have been precipitated by the illness of her mother, whose life was at the time described as being in danger, and patient became depressed, anxious, self-reproachful, irritable, sleepless, and had nihilistic ideas, saying "I will never die, I will live for years for my sins". She has had 5 courses of electroshock therapy, a total of 30 shocks, with partial remission followed by relapse after each course. She is tense and fearful and food intake has to be carefully watched. She is classed as predominantly agitated.

Case 5 (No. 31).—A married woman admitted in 1952 at the age of 54 and discharged from hospital after seven months. As a child she was jealous of a younger sister and married at twenty to get away from home. Husband is suspicious and possessive; patient is rigid and over-particular. Five years before admission gradually increasing symptoms of insomnia, tension, irritability, lack of concentration, and depression. Three courses of electroshock therapy in hospital with little permanent effect, a total of 21 shocks. Afraid to go home, family unsympathetic, patient tense and apprehensive on discharge. Classified as having preservation of affect.

Case 6 (No. 34).—A married woman admitted to hospital in 1951 at the age of 50 and not yet discharged. Childhood unhappy, mother died and father abandoned the children when she was a child; brought up by an aunt who gave more affection to her own children. Patient has no children of her own and has been on poor terms with her husband for years. Illness began two years ago following a hysterectomy and the death of her mother-in-law whom she disliked. Symptoms were of insomnia, lassitude, anxiety, headaches and weeping. She showed paranoid features, blaming all around her for her misery, with considerable expression of resentment against her relatives. Improved only very briefly after one course of 8 shocks of electroshock therapy. Classed as depression with predominantly paranoid symptoms.

Attempts to base prognosis solely on symptomatology are confusing and misleading. Nevertheless, at present, such criteria seem to be decisive in estimating prognosis with or without electroconvulsive therapy. This approach runs counter to the conceptions of patient-environment interaction proposed by Adolf Meyer 30 years ago, and now generally accepted. Meyer consistently advocated that symptoms and syndromes are the expression of the patient's attempt to adjust to life situations which are beyond his capacity. The symptoms are not to be overestimated but to be seen against the background of the patient's organic and psychological equipment in its dynamic relationship with environmental stresses. Meyer (1922) stated: "The best facts still are the data of observation of behaviour and mentation, i.e. the facts we can observe from the beginnings of the disorders. But even there it is best not to lay too much stress on the formal facts but to work from the start with the dynamic as well as the descriptive data. The consequence has been that, for a long time, I have not been as much interested in the question: Is the case one of dementia praecox or manic-depressive insanity? as in the question: What combination of facts and factors does the patient present? What are the reaction groups and the factors at work? What are the facts I have to reckon and work with? What are the assets? What is the group tendency of the reactions, and the individual prognosis?" *and* "But under no circumstances do we consider the mere formal material adequate for a prognostic forecast without a survey of all the dynamic or causal factors and a thorough trial of the responsiveness of the patient to a distributive analytical and reconstructive study."

Malamud, Sands and Malamud (1941) undertook a study of prognosis in involutional melancholia. They followed a number of patients, who were ill before the introduction of the shock therapies for some years, and their paper records their observations. They drew the following conclusions: "The development of the psychosis (involutional psychosis) depends upon a variety of factors which tend to render an adjustment to the involution more difficult. Chief among these are (*a*) special types of personality organization lacking in plasticity and restricted in interests. (*b*) Conditioning experiences which enhance these weaknesses. (*c*) Precipitating factors in the form of catastrophic occurrences which threaten the sense of security or the continued possession of subjects of strong attachment. The following factors were found to be of importance in the consideration of criteria of prognosis—Age, intellectual level, adequacy of adult sexual and family adjustment . . ." Malamud, Sands and Malamud laid special emphasis on the influence of certain precipitating factors as prognostic criteria. They state "Economic stress can be remedied, worry over children or other relatives may prove unfounded or exaggerated, but the death of a loved one or the loss of a house to which one is attached has the stamp of inevitability".

In the six patients described above who are typical of the whole group, many of the prognostic factors mentioned by Malamud and Sands are apparent. The frequent occurrence of adverse external circumstance pre-supposes that external factors ("socio-psychiatric") are of major importance not only in the precipitation of the illness but in its perpetuation. This does not explain the frequent observation that some patients recover in the face of adverse external circumstances; that some patients break down at the climax of their career; and that others fail to improve or relapse when the environment is apparently beneficial. In a subsequent section of the paper, material will be advanced which supports the view of those who hold that an internal (psychological) factor is often the decisive one in determining the outcome of the disease.

THE CLINICAL MATERIAL—GROUP II

This group is composed of eight patients, five of whom are still under treatment. In these patients the average age at onset was approximately 54 with variations in individual cases, between 39 and 62. The average age now is 57 with limits between 40 and 63. The average duration of illness is three years. The number of electroshocks received varied between five and twenty with an average per patient of approximately twelve. Of the eight patients, four are married, one is single and three are widows. In six instances, the patients became ill after an important emotional stress such as death of husband, serious illness of near relatives, etc. Only two fell ill without any apparent determining event. One patient was predominantly paranoid in her attitude. Three were predominantly agitated. All, except one, were able to enter into emotional contact with an examiner. Only one patient was very hypochondriacal. All were very depressed, tension and anxiety of varying degrees being common accompaniments. The illness has been continuous in six patients and episodic in two. At present, five of the patients are in hospital.

The outstanding characteristics of the group were their intolerance of aggression and their marked reaction to loss. In dealing with the former, two main defence mechanisms were used—"turning against the self" and projection, whereas with the latter denial was the most usual reaction. Wherever the possibility of loss arose, unconscious conflicts over aggression could be discerned. For example the absence of one of the therapists or of a member produced signs of deepening depression within the group. On such occasions patients appeared to be seeking for memories to show that they had been responsible for the absence of the missing person. Associations always led to thoughts of death and memories of the loss of spouses, parents, siblings, etc. Dreams were reported in which the death occurred of a person still living. For example one patient was tormented by a recurrent dream of great clarity in which she received a telegram informing her of her father's death. In her waking hours she spoke of him with the highest esteem and affection. After her father's death recently she dreamt that the husbands of her three best friends had died. Both this patient and one other who sustained actual loss by death while under treatment reacted with denial. The symptomatology of the former changed to a mild hypomania. In one instance of psychical loss resulting from the indifference of her sons, a patient became acutely depersonalized.

The aggressive conflict associated with loss invariably resulted in bitter self-recrimination. As the patients learned to tolerate their inner hatred it was observed that the amount of self-criticism diminished and the capacity to be critical increased. Associated with this was a revival of repressed memories where aggressive wishes had been directed against spouses, parents, siblings, etc., who had subsequently died. For example, one patient had the greatest difficulty in being angry with another group member. When she was eventually able to show these feelings she recalled a painful rivalry situation with a sister whose death was the precipitating factor in her depressive illness. One patient stated that the reason for remaining in hospital was her fear of venting her anger on her aged parents. This event, if followed by their death, would have been a repetition of the situation following her husband's death.

Hatred is not only a threat to others but also to themselves. They constantly attempt to maintain "good" relationships, but this is imperilled by the projective defence mechanism. This results in all people eventually becoming hostile and critical. They unconsciously attempt to placate these "hostile" people by adopting a passive attitude. This is one cause of the dependency which is so apparent with these patients. This dependence is forever creating anxiety. They consciously recognize their emotional vulnerability. From the early days of the group the patients apprehensively awaited the termination of the treatment, "the doctors may at any time be promoted and sent to other hospitals". The approach of the holidays intensified these fears and just before the group closed for a period these topics were a constant theme. Another anxiety was that they might be dismissed by the therapists for being too demanding. They wondered how anyone could put up with their constant complaints and demands.

Without doubt the patients' needs from others are enormous and consequently the pressure to remain on good terms is enhanced so that these demands will be met. Their previous experiences of rejection when attempting to satisfy such needs are an ever present warning against showing what the other person (e.g. the therapists) may regard as unacceptable. They dread rejection and frequently after an outburst in the group they express fear lest they be not allowed to return. For example, one patient, now living at home, criticized one of the therapists and stated afterwards that she was sure that if she repeated this behaviour she would be brought back to hospital, forbidden the group and given electroshock therapy which she dreaded.

An account of two patients is given below to illustrate in more detail some of the points already mentioned.

Case 1.—Mrs. A.—Age 62 years.—At the time of admission to hospital, this patient was markedly agitated. From time to time she screamed and said that some terrible fate was going to befall her. She spoke fluently with pressure behind her words. Fear, anxiety and depression dominated her thoughts and she believed she was dying of some incurable physical disease. Constantly, she sought reassurance from the staff. Her physical examination revealed only severe bilateral varicose ulceration of the legs.

The following is a résumé of the history obtained from her husband. She was of Highland stock and was one of a large family. Her childhood as far as he knew was a happy one. She was a good scholar, taking an arts degree and then training as a teacher. They were married when she was 28 years of age. The marriage was a happy one and they have three sons. The two elder ones are married and live away from home. The youngest is still at home. Her father died, aged 72, cause unknown to the informant. In 1944, the patient found her mother, who had been living with her, dead in bed one morning and was most upset afterwards. In 1945, she had a nervous illness and was admitted to a mental hospital. The husband described this as a persecution complex. She thought he wanted to be rid of her so that he could live with another woman. In 1948, she had electroshock therapy and was allowed home soon after. They were quite happy until April, 1952, when, travelling to visit her son, she was involved in a train smash and was detained in hospital for three weeks with bruises and abrasions. When she left hospital, she went to her son's house. There she became upset and was removed to an observation ward. A few weeks later she was transferred to another nearer home, where she continued to be noisy and excited, and was given 6 electroshocks. She went home, but 3 days later, as she was again agitated and screaming, she was brought to hospital in the state already described.

In hospital she settled, but when a month later she attempted to go home for the weekend she again relapsed and came back very agitated and upset. Soon afterwards, she left the hospital but had to return ten days later. She was agitated, shaking and stuttering. Her son said that she had been well until two days before her admission. By the afternoon of admission she was very upset, clinging to her husband and son asking them if she was going to die. She herself stated that she had relapsed because her son had had a few drinks and then had had an epileptic fit.

This patient was chosen for treatment by group psychotherapy and began to attend shortly after her unsuccessful weekend at home during her first period in hospital. She had been attending the group somewhat irregularly since then. Being a member of a group meeting three times per week, she has been studied much more carefully than is normally possible in mental hospital practice.

The following is a brief outline of her history as it emerged under group conditions. Her early relationships were not at all good, particularly with her mother. As a child, she never felt close to her mother, who quite truly preferred the other daughter who was neat, petite, and very careful in her dress. The patient felt that from early in her life she was casual about clothes and "hoydenish" in her behaviour because it did not seem to matter whether she tried or not. She recalled how on one occasion, Sunday at church, everyone was remarking on her sister's appearance. However, the family did not want her (the patient) and she wandered back home by a different route. At school, however, she was very successful and from an early age got satisfaction from her academic and intellectual success. Her father, she always felt, was petted and spoilt in the home to the detriment of the welfare of the children. She recalls her mother saying that a wife must never, under any circumstances, do or say anything to upset or displease her husband. The atmosphere was one of strict morality of the sternest Calvinistic type. As she grew up she liked to be alone and used to wander among the hills and muse. Her tendency to hill-walk was not approved of by her mother, who thought it "tomboyish".

Although at University she was fairly successful, she did not manage to distinguish herself as she had hoped. Every so often she would stop working and go away into the country. This practice occurred so frequently that it interfered quite considerably with her academic progress. She made no lasting friendships. After qualifying as a teacher, she was fairly happy. During the 1914-18 war a young man, in whom she was interested, was killed but there is no further information about this yet. About the same time, or a little earlier, her sister died. What little she has said about this indicates that she was overwhelmed by the loss and never succeeded in working through the mourning process.

When she married soon after the war, there appears to have been little affection on her part to begin with. She refers back to the early days of the marriage and the physical relationship in bitter remorseful and self-recriminating terms. The marriage was "obscene" and "like prostitution". She hated her husband and used to be happy only when his work took him abroad. They had three sons and she sought to establish with them relationships which would compensate for her unhappiness. The absence of her sons in war service and their marriages during this period deprived her of this comfort. Her father had died before the 1939-45 war and the death of her mother in 1944 seems to have precipitated the first illness. The description of her feelings as she lay in hospital for over three years is poignant in the extreme.

When discharged, she lived with her husband and one son. The latter was a comfort to her, though he had not settled well after the war and was inclined to drink a little too much. Then came her accident. While in her son's house she had become agitated and he had struck her on the face. From that occasion she had been unable to control her screaming and finally came to hospital here. Following her first discharge and subsequent readmission there was at first little to indicate what had happened. She did, however, at first criticize her son once or twice for drinking too much. Her husband, of course, was severely criticized as usual. Finally, however, she stated that she had been carrying on at home with difficulty. Her husband was being thoughtless as usual but she felt her son was supporting her more than he usually dared to do. Then one night the son came in having had a fair amount to drink, sat down, and proceeded to tell his father what he thought of him for his behaviour to his mother. The father flared up and terminated the ensuing quarrel by ordering his son to leave the house. The house belonged to the patient and, caught in a situation of great conflict, she at once began to scream, and was forthwith sent to hospital.

The most apparent feature of this patient's psychology is her intolerance of anger. So afraid is she of feelings of this type that even when a situation arises when anger would be justified, she will go to great lengths to deny its presence to herself and to others. In fact, she goes out of her way to be "nice" to those towards whom she would like to direct her anger. Always present is the fear that "something unbridled will break loose". The intensity of this feeling may be judged by the number of defence mechanisms which she employs to deal with it. First of all and predominantly she directs her anger against herself, lashing herself self-punitively whenever she has been annoyed. This, however, is not sufficient and a residue of the emotion is projected into the outside world as a paranoid defence.

She preserves her "good objects" desperately in this situation by splitting the feelings so that the loved person remains immaculate and the "bad object" beyond the pale. Frequently, her "good objects" are authoritative males, terrifying figures, who cannot really be faced, but must be placated and held in impossibly high regard. She unconsciously identifies herself with these figures and can then aggressively manipulate and challenge other people just as she feels herself to be manipulated by the omnipotent ones.

Her reaction in the group to the absence of one of these ambivalently regarded authoritative persons (the therapists) was to behave completely as she thought he would have behaved—not merely sitting in his chair and using his mannerisms but even interpreting in his usual style. Much of her fear of aggression is expressed in oral terms. She commented on one occasion that people had terrible feelings inside them which their consciences did not tolerate, and gave as an apparently abstract example the wish to poison one's husband. She was also much afraid of hurting people with her tongue. The motives of doctors were suspect when they gave her a sedative. She reacted violently to an administrative error when a supplementary issue of milk which she had been receiving was stopped. This upset her for days, as she felt that something was being withheld from her which was vital to her existence.

She commented that her life had been one long struggle for independence, an independence which she had never managed to achieve. She unconsciously believed that threatening figures, upon whom she depended, were always liable to do something unexpected and terrible—in the psychotherapeutic setting she might at any time be rejected, told never to return to the group, and be given E.C.T., a treatment which she regarded with the greatest terror. Her need to establish good relationships was, and always had been, compulsive. However, those with whom she could best establish contact were often people whom she fundamentally felt to be her inferiors. Frequently she illustrated her "democratic" outlook by telling how she had long friendly and intimate talks with tinkers, gypsies, tramps or tradesmen. Her behaviour to the other patients in the group was very similar to this pattern.

An outcome of her ambivalent attachment to her mother was an over-estimation of the male sex with whom she identified herself. For her, her intellect was her claim to masculinity. Inevitably this discontent with femininity led to disturbances in her sexual life. Her sons became the embodiment of her longed-for masculinity and her eventual disappointments with them were important factors leading to her psychosis. The paranoid delusions can be understood in terms of projection of her own unconscious masculine strivings. The intense anxiety and agitation which followed E.C.T. were the result of a disruption of the psychic equilibrium maintained by the illness. The defence mechanisms were weakened resulting in a breakthrough of intense aggression with resulting anxieties.

Case 2.—Mrs. B.—Age 57 years.—A mental examination carried out at the time of admission to hospital four years ago indicated that the patient was depressed and mildly agitated. Hypochondriacal symptoms were quite marked and she suffered from retching. Her sleep was poor. She felt she was bottling up feelings against her parents.

The following history was obtained from a sister. There were five children in the family, of whom the patient was the eldest. The patient had always been a jolly friendly type of person, who had been very fond of her parents. She had, however, been rather nervous and, as a child, had been unable to travel very well as she suffered from diarrhoea. She left school, aged 14, and worked in an office for two years, leaving because she suffered from indigestion. Employment was found for her nearer to her home. Five years later, she left and came home to act as housekeeper for her parents. At this time, she became more nervous and irritable. She began to suffer from intractable diarrhoea. About this time, she became engaged and her fiancé went abroad. The patient broke off her engagement, stating she was not well enough to follow him.

She remained at home from this time, being usually cheerful and methodical though troubled frequently by diarrhoea. In 1928, a laparotomy was carried out, and she had a portion of bowel resected. Since then she had been increasingly nervous and had been prone to gastro-intestinal disturbances when subject to stress. In 1940, she married a widower, a man much older than herself. She had to share a home with her brother-in-law and adult step-son, neither of whom she liked. The marriage was not as happy as it might have been as a result of this. Later the same informant told one of the medical staff that the patient had had a serious quarrel with her husband not long before his death. During this quarrel, she had threatened to leave, and her husband had been most distressed. Her husband had died early in the year of admission and following this event she had been increasingly agitated and depressed. Her appetite had been poor and she was losing weight. She was sleepless and much troubled by diarrhoea.

She had two electroshocks, then left hospital, returning a fortnight later and receiving a course of 6 shocks, before being discharged. From then until her final readmission in October, 1950, she was readmitted four times, and had two further courses of electroshock therapy. In addition she went to a nursing home, where she had six cardiazol injections. Gradually, she developed marked obsessive-compulsive tendencies. Her memory was poor, and her handbag and cases were bulging with note-books containing her "memory". She could not even decide whether to get up or remain in bed.

During group treatment, the following information was obtained: Her home-life from an early age had been an unhappy one. Her mother had always been a distant, cold, demanding, authoritative person. Pleasure of all descriptions was forbidden. Even reading was discouraged and she had instead to carry out meticulously some trivial household task. Her relationship with her father was not good, but he always seemed unimportant to her. Starved of the essential affective relationships, the siblings turned to each other, and today she is closer to them than to her parents. Always, however, she felt excluded and thought that her mother regarded her as less worthy of affection than the others. As she grew older, her difficulty in travelling increased her sense of being different, and finally dictated her employment as she had to work close to her home. Socially she was never at ease with other people, and some alimentary disturbance frequently interfered with any special occasion. Her relationships with men were almost non-existent, and she always felt ill-at-ease in their company. On one occasion, her fiancé kissed her and afterwards she was sure that she would become pregnant.

Her married life, as her sister reported, was punctuated by quarrels and disagreements. The failure to be on good terms with her step-son caused her much unhappiness. His attitude to her was to ignore her as far as possible. She did not feel any easier for being the previous wife's best friend. With her husband, she found she was never quite sure of her role, for she felt that by marrying a man older than herself she had missed his youthful ardour. The painful thought always lurking in the back of her mind was that he had acquired a housekeeper and not a wife.

After his death, she brought her parents and sister into her home. While she had been married they had closed ranks completely, and she was no longer a member of the family circle. When she came out of hospital, she felt that she was not wanted. Her mother, previously so meticulous, was now older. Any attempts on the patient's part to clean up were interpreted by the mother as a slight on her housekeeping. The fact that her parents were now old and frail prevented the patient from expressing her indignation. An attempt to go home while on group therapy failed. It appeared later that the patient, now freer in expressing her feelings, had quarrelled with her mother and the sister had come to the mother's rescue.

Once again the outstanding feature among the internal factors precipitating her illness is her intolerance of hatred. Her silence is a defence against hurting her mother or anyone in her environment. Following a recent period of absence from the group she stated that she had stayed away because her presence was harmful to other group members. Her "good" objects are preserved in that role only by splitting her affective relationships, and again she tends to select people whom fundamentally she regards as punitive and authoritarian. Permanently present is the fear that her "badness" and her "differences" from other people will be discovered and she will be rejected by the person to whom she speaks or by the group in which she finds herself.

Oral problems are present here too. She seeks constant reassurance and if this is not supplied by her doctor she will force him to take some action if she possibly can by presenting a physical complaint. During her stay in hospital she had been treated with many medicines. Unfortunately once she was given a drug she refused to do without it. Her diet was a frequent subject raised by her on the ward round and any alteration in it caused a profound reaction on her part. Her silence and withdrawal represented not only a defence against, and a turning inwards of, anger but a profound regression to a more passive state. Furthermore by her silence she succeeds in controlling people in the aggressive way in which she really wished to manipulate her family.

Her great ambivalence in her relationships with her mother was highlighted when, following a session in which she attacked her mother, she dreamed that she received a black-edged letter notifying her that her mother had died. Her problems with her siblings caused her great pain, and, in particular, she could not face her rivalry with her sister who lived at home. Her relationships with one patient in the group, who hectored her and tried to push her into recovery, were clearly a repetition of her relationship with her sister who frequently behaved in the same way—even, on one occasion, in the presence of one of the authors. Her amnesia represents a protection against the painful memories and affects concerning her dead husband. The price which she pays for this protection is the painful obsessive compulsive doubts and attempts to remember day-to-day trivialities.

Psychically she remains tied to the oedipal situation. Her solution was quite different from that of Mrs. A. Mrs. B. failed to make a satisfactory external adjustment, always being afflicted with hysterical symptoms (e.g. the diarrhoea) and phobias (travelling). She remained tied to her home and her marriage was a repetition of her oedipal problems when she married the widower of an older friend. When the patient's husband died she persuaded her family, against their will, to live with her, recreating the original environment from which she had tried to escape.

Discussion

In an earlier part of the paper attention was drawn to the fact that a high percentage of patients in the first group had originally presented symptoms which are usually associated with a good prognosis. Many longer series have been studied which have shown the statistical validity of estimating prognosis in these terms. Nevertheless it is extremely difficult, as the above series demonstrates, to apply the results of such large-scale investigations to the outlook for the individual case. All one can do is to give an estimation of probability of recovery. The prognosis ought to be better where the patient is deeply depressed, retarded and free of hypochondriacal and paranoid trends. A study of "failed" cases shows that this is not necessarily so. The authors feel, therefore, that efforts must be made to seek further guides to prognosis which will aid the psychiatrist in handling a particular patient.

The authors consider that prognosis can be best estimated by taking two factors into consideration, one, an external factor ("socio-psychiatric") and second, an internal factor (psychological). An external factor which frequently precipitated the illness was the death of some close relative or friend. Loss of sons by marriage was also important. Physical illness was a common precipitant. All these events may be regarded as traumatic but are nevertheless part of the life stress of everyone at times. The reaction of these patients to such occurrences must be regarded therefore as unusual. Since their reaction is inappropriate the explanation for the illness must be sought in themselves and not in the environment. Frequently the apparent precipitating factor is a triviality, such as a disagreement with a neighbour. Such patients are no more and no less ill than those in whom the factor is clear-cut and obvious. Among those studied there is nothing to suggest that evaluation of the external factor mentioned above would help to judge prognosis.

The environmental circumstances of many of the patients were and are good when these are viewed in isolation and not in terms of the relationships and attitudes of the patient. For example, Mrs. A. has a conventionally good husband who treats her in a kindly way, though he is not always understanding. She has one son at home. The other sons are very fond of her and she has a standing invitation to visit them whenever she wants and for as long as she wishes. Her material circumstances are very good. Mrs. B. lost her husband but her parents, though old, did rally to her assistance, even giving up their own valued home in order to come and live with her. It is only when we consider how this environment must appear to the patient as a result of the inner difficulties described in the second section of this paper that we can understand how unlikely their recovery is by any form of treatment which does not produce a radical alteration in psychic structure.

Observation of the patients who were studied in detail supports the view that involutional depressions occur in previously poorly-adjusted personalities (Malamud, Sands and Malamud, 1941). Neurotic adjustment, at times concealed, had been the rule, and hysterical, phobic or obsessional reactions had been present in all of them. One might describe them as life-long neurotics sufficiently well protected to manage without medical aid until the added stresses of middle age provoked a catastrophic reaction. The application of electroshock therapy as a specific is of doubtful value. Patients who have failed to benefit illustrate that the treatment does not alter the basic unconscious patterns. Guilt and anxiety over unconscious death wishes, as reported, for example, in the dreams of patients, or severe injuries to self-esteem are not assuaged by the electrical shocks.

An internal factor, namely, the great fear of the destructive force of anger and hate must obviously be considered in any attempt at assessment of prognosis. An interesting case was reported by Grotjahn (1939) in which he observed the recovery of a depressed female patient who was given metrazol therapy. He noted that during the depressed period she spoke highly of her mother, but as she recovered she voiced clearly her hatred and hostility. Grinker and McLean (1940) and Levy and Grinker (1943) paid particular attention to the phenomenon which the authors in the second group considered to be one of the most readily observed features of the inner factor, i.e. difficulties with aggression. They were of the opinion that electroshock alters the dynamic equilibrium between the repressive forces and the inhibited aggressive drives, resulting in freer expression of these affects in various ways. By utilizing electroshock as an adjunct to psychotherapy, these writers believed that they could produce a stable therapeutic result, as the aggressive drives were now accessible to a psychotherapeutic approach.

In a recent paper, two of the authors (Freeman and Cameron, 1953) had independently reached somewhat similar conclusions about the psychodynamic aspects of electroshock therapy. However they drew attention to the release of anxiety which accompanied the emergence of the repressed aggressive drives towards consciousness. Those who recover are those who succeed in re-establishing their psychic economy and integrating the previously repressed anger in their mental structure. The anxiety diminishes as the patient achieves psychic homeostasis of a more satisfactory type. Some fail completely, re-establishing homeostasis of a depressive type by reinforcing repression of the unacceptable drives. Others remain anxious, dealing with it by their old neurotic defences. Patients have been observed during and after treatment with electroshock therapy. Many complain of severe anxiety. This anxiety was most marked in those patients who failed to recover. The content of the anxiety consisted of "persecutory" feelings. The patients felt that they were alone and unwanted and at the mercy of a hostile environment. In particular, this anxiety was centred on the figure of the anaesthetist who administered pentothal and scoline. Many patients described him as an enormous bear-like figure who manhandled them. In actual fact this anaesthetist is not merely skilled technically but is extremely sympathetic in his handling of the patients. The route to the treatment room became fraught with terror. The patients would no longer walk that way when going to the canteen or occupational therapy department although it is the only covered route in inclement weather.

Kalinowsky and Hoch (1952) state "fear of electroshock therapy is a greater problem than was originally realized. This refers to a fear which develops or increases only after a certain number of treatments. It is different from the fear which the patient unacquainted with the treatment has prior to the first application. After several treatments, when the patient is much better, he develops an increasing fear for which he is unable to account. This late and quite intense fear is not explained by any discomfort from the treatment nor by the psychotic fears, which have usually disappeared at least temporarily, by this time."

The authors believe that this anxiety is due to a disruption by the electroshock therapy of defences which were holding unconscious aggressive drives in check (Freeman and Cameron, 1953). Hence this anxiety appearing during the treatment may be used as an index of prognosis in terms of an internal psychogenic factor—a belated sign if the patient is to be spared unnecessary treatment which for her is of a painful nature.

The authors suggest that careful evaluation be made of the aggressive conflicts, particularly where there appears to be a breakdown in the defences against this drive as shown by the presence of free anxiety. It is important to emphasize that this anxiety is a subjective phenomenon of the type mentioned above, and is frequently not observed in casual contact with the patient. It must not be confused with the agitation which can be objectively observed in many involutional depressions. It has been noted that the anxiety of the type referred to here increases when the psychiatrist introduces themes of aggression in relation to the ambivalently loved objects. L. Alexander (1953) has also commented on the fact that patients who manifest severe anxiety before treatment do not have such a good prognosis.

The authors propose that the following factors must be considered when estimating the prognosis in involutional depression:

1. The symptomatology—the nearer the clinical picture approaches the classical melancholia with retardation, ideas of self-reproach, etc., the better the outlook (see review of the literature).
2. The "socio-psychiatric" factor—the more isolated the patient, the fewer human contacts, the worse the prognosis.
3. The internal (psychological) factor—this must be estimated, not only with reference to the present conscious and unconscious attitudes and conflicts, but also in relation to childhood object relationships and modes of adaptation. The degree of ambivalence to parents and siblings in the past and in the present to relatives and hospital staff should be assessed as carefully as possible. The prognosis will be worse where there is little capacity to tolerate the aggression which will be freed by the electroshock therapy. This capacity must inevitably be less where the patient had few "good" object relationships in early life.

SUMMARY

Two groups of patients suffering from involutional depression who did not respond to electroshock therapy have been studied. An approach in terms of symptomatology has been found to be inadequate in explaining failure to benefit by treatment. The authors suggest that both an external ("socio-psychiatric") and an internal (psychological) factor must be taken into account in considering prognosis.

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THE THERAPEUTIC VALUE OF LYSERGIC ACID DIETHYLAMIDE IN MENTAL ILLNESS

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D-LYSERGIC acid diethylamide (LSD 25) was first prepared in 1938 by Stoll and Hofmann. It is the synthetic amide of d-lysergic acid with a secondary amine, diethylamine and belongs to the ergonovine group of ergot alkaloids all of which have lysergic acid as a base. After its ingestion in minute doses, it induces psychic states in which the subject becomes aware of repressed memories and other unconscious material in a setting of clear consciousness. This preliminary paper describes the results obtained from the use of the drug in 36 psychoneurotic patients over a period of one year. We consider that the drug will find a significant place in the treatment of the psychoneuroses and allied mental illnesses.

HISTORY OF D-LYSERGIC ACID DIETHYLAMIDE

The experimental studies which have been carried out on LSD 25 may be classified according to the effects of the drug on:

- (*a*) The behaviour of animals.
- (*b*) Normal human subjects.
- (*c*) Psychotic patients.
- (*d*) Comparison between LSD 25 and mescaline on psychic changes in normal and psychotic subjects.
- (*e*) Psychoneurotic patients.

(*a*) *Effects on the Behaviour of Animals*

The effects of LSD 25 on the behaviour of animals are very different from those observed in man and need not be further considered.

(*b*) *Effects on Normal Subjects*

Stoll (1947, 1949) who has reported in detail the chemistry and pharmacology of the drug, considered that the symptoms produced by LSD 25 in the normal subject were an expression of an acute exogenous psychosis analogous to that produced by alcohol, opium, cocaine, hashish, mescaline and the amphetamines. There is no uniform reaction to LSD 25 although Becker (1949) and Rinkel *et al.* (1952) have distinguished two main types: (*a*) manic or depressive reactions and (*b*) schizophrenic reactions; the majority of subjects showed a mixture of these two extreme types. Most of these studies on normal subjects have resulted in a classification of the psychic material on a symptomatic basis, and there has been little correlation of the material with the personality, interests and personal problems of the subjects. No attempt appears to have been made to study the dreams of these normal subjects although in some recent work the subject has been found to relive the LSD 25 experiences in his dream life (Elkes (1953)). Nevertheless, the studies on normal subjects which have also been reported on by Condrau (1949), Georgi *et al.* (1951), Matefi (1952), Mayer-Gross (1952) and Weyl (1951) have enabled a great deal of material to be collected from which the probable behaviour of psychoneurotic patients might be predicted.

(*c*) *Effects in Psychotic Patients*

The effects of LSD 25 on psychotic subjects have been reported by Stoll (1947), Giacomo (1951), Condrau (1949), Busch and Johnson (1950) and others. Psychic changes in these patients are only found after large doses and take the form of an exaggeration of the psychotic state.

(*d*) *Comparison between effects of LSD 25 and Mescaline*

Comparative studies between the action of LSD 25 and mescaline suggest that the psychic effects of the two substances are alike in their mode of presentation but that they differ in content (Fischer, Georgi and Weber (1951)).

(*e*) *Effects in Psychoneurotic Patients*

Busch and Johnson (1950) reported their results after giving LSD 25 to eight cases of psychoneurosis. The drug was used as an aid to psychotherapy, and all patients had experiences which profoundly influenced the course of their illness. The remembering and reliving of childhood experiences were particularly prominent and two patients improved sufficiently for treatment to be discontinued. There is, however, no indication in this paper of the technique used, frequency of administration or number of treatments given. Gastaut *et al.* (1953) only consider the possible therapeutic use of the drug and do not report any cases to whom it was actually given.

THE LSD EXPERIENCE

We use the term "the LSD experience" to describe the combined objective and subjective changes induced by the administration of LSD 25. Most previous authors have failed to relate the objective findings of changes in consciousness, mental tension, emotional behaviour and muscular activity to the subjective changes experienced by the patient. One of the objects of this paper is to stress the related nature of all phenomena produced by LSD 25 and that the objective findings and subjective experiences are not to be regarded separately.

Before the detailed objective and subjective changes are considered it may be mentioned that the LSD experience usually lasts 4-8 hours but may extend for as long as ten days. Typical experiences may also occur at intervals up to eight days after the administration of the drug.

OBJECTIVE RESULTS

1. *General*

While there is considerable variation in the effects produced by LSD 25 the following gives a general picture of the course of events:

Clinical signs of the drug's action begin to be observed from 20-50 minutes after it has been given either orally or intravenously. An early sign is increased emotional activity and in about one-third of the patients, this is characterized by a tendency to giggling, uncontrolled laughter, or less frequently by crying. These phenomena tend to pass off as the more disturbing subjective experiences associated with the height of the reaction occur. These experiences start from 45-100 minutes after administration and last from 30 minutes to several hours. Almost all patients become distressed; the face is flushed; the eyes may be fixed or moving as if following hallucinations; breathing may be rapid and distressed or Cheyne-Stokes in character. The patient usually prefers to be lying down but will sometimes sit on the bed with his feet curled under him in a catatonia-like attitude. Frequently there is a tendency for the patient to regress to an automatic, uninhibited and more primitive type of behaviour. Repressed material may be produced with great freedom and emotional release in the form of screaming and crying frequently occurs. In response to the upsurge of psychic material, disturbed or even violent behaviour may result. Reproduction or accentuation of observable neurotic symptoms is common and the patient may pass into an acute state of violent trembling, sweating and tachycardia, recognizable by him as an anxiety attack. There is usually a desire for human contact and the patient may demand not to be left alone, becoming much more disturbed and restless if left. A few patients resent the approach of another person, but these patients are usually inaccessible and the therapeutic outlook in such cases is poor. Increased sensitivity to criticism or changes of environment is customary, as is increased verbal facility, although this depends very much on the patient's attitude to the person present. A change of nurse, or of environment from one treatment to the next may completely alter the patient's emotional response and verbal facility. The experiences at the height of the reaction usually occur in the form of crises which are repeated at intervals of 5-10 minutes; frequently the patient can fully describe these experiences at the time owing to the increased verbal facility present, but occasionally the power of speech is lost and the experiences can only be described afterwards.

Patients undergoing the treatment often give out a peculiar phenol-like odour. The cause of this is unknown.

In women, disturbance of the menstrual function in the form of excessive loss at the beginning of the period may occur and may be controlled by ethinyl oestradiol if necessary.

2. *Consciousness*

As usually defined, consciousness is clearly retained in almost all cases. Most of the patients appear to be partly withdrawn from reality but are able to describe their experiences afterwards with remarkable clarity. It seems that the function of consciousness is increasingly and sometimes entirely related to "observing" internal, psychic, events during the LSD experience and that it may become temporarily unrelated to the external world. This accounts for the patient's own feeling of watching himself whilst he is under LSD 25 and some patients have been able to exercise control over the psychic images they are observing. This is the ideal to be aimed at, as it is then possible for the patient to explore his own mind whilst retaining sufficient consciousness to record the experience and to reproduce it afterwards. In other cases the flow of psychic events is beyond the patient's control and he merely feels himself an observer of the situation, retaining sufficient contact with the outer world to describe the situation as it develops at the time. A patient may become completely "lost" for some hours under LSD and occasionally can remember nothing of the experience afterwards. We regard this as an indication for stopping treatment, as it may signify the onset of a psychosis.

The Patient's Subjective Experience

It is our present view, which may well be modified by further work, that the subjective experiences of patients under LSD are of two kinds:

(*a*) Experiences which are the direct result of the toxicity of the drug and which are common to most patients.

(*b*) Experiences which are manifestations of the patient's unconscious and are, therefore, peculiar to any particular patient.

These two kinds of experience will now be considered in greater detail, but it must be emphasized that the distinction between them is not clear-cut since, for example, the actual release of unconscious material appears to be due to the toxicity of the drug although the nature of the unconscious material released is peculiar to the patient.

Experiences which are Toxic Effects of LSD 25

These effects are seen from 20-50 minutes after the administration of the drug and are marked by feelings of nausea, dizziness and warmth or coldness. Most characteristic is the assumption by everything around the patient of definite colour. Everything becomes tinged with blue or red, etc., so that the whole treatment room and its furnishings appear to be of one particular colour. The environment also becomes plastic, with individual parts of the walls moving to and fro, and patients who feel tears rolling down their faces although they are not actually crying feel also that everything within sight appears to be crying, with the walls of the room running with tears. In the case of a few patients, however, external objects do not appear to change, but they seem unimportant, the patient behaving as if the objects in the room were not there.

The seeing of faces by the patient is so common that it may be a toxic effect of the drug. During the early treatments the faces may be unidentifiable but in later treatments the patient may come to recognize them as belonging to some definite persons. Sometimes such an image is of the eyes only, frequently many eyes, all of which appear to bear the same message to the patient.

Experiences which are Manifestations of the Patient's Unconscious

These experiences occur during the height of the LSD experience and appear to be of three types:

(*a*) The hallucinatory experiences resulting from a general non-selective disturbance of the unconscious.
(*b*) The reliving of repressed personal memories.
(*c*) The appearance of impersonal unconscious images.

Hallucinatory Experiences

Hallucinations may be organic (somatic), animal, human or merely coloured or moving shapes. Frequently the patient seems to withdraw from reality into a timeless world. He may be aware of an atmosphere of ancient happenings and the feeling of being in some ancient land: Egypt is particularly common. There is no constant pattern of hallucinatory experience of any one patient, but in successive treatments the patient may experience images of the same kind which behave in a progressive or evolutionary manner. These experiences may be best understood from the following description given by a patient:

> "After lying down on a bed I began to see, wherever I looked, faces which were only half-formed, perhaps an unborn child's or a monkey's face. During this time part of me was detached and watching the part of me experiencing these illusions . . . When I looked at the doctor's hand the detached part of me saw it as it was, the other part experienced a feeling of horror, the hand was brown and wrinkled with age and not living, it was so old as to be ageless, there was no time and never had been. There were sand and bright colours which were Egyptian strips of ornamentation and a Sphinx. There I am confused, but I believe that the first spasm of terror and revulsion overcame me, and I began crying and screaming "Oh, no" repeatedly. Following this were pictures such as one would see in a book, diagrams showing separate parts of the body, veins, sinews, nerves, etc. I also saw my mind, then there were confused pictures of plants, leaves and insects, and then a spider's leg, the size of, and looking like, the leg of a crab. This was broken and here again the feeling of horror overwhelmed me and I was terrified. All the above pictures were in vivid colours and were repeated again and again, and with all this there was a great hunger, for what I do not know. I was also very hot, so hot as to be almost cold, and time had ceased to exist for me."

Patients elaborate their hallucinatory experiences in a number of ways and the mental mechanisms of identification and projection are frequently seen:

Identification Phenomena

Identification is usually either with a known person or with one of the mental images of the experience. Several patients have thought themselves to be their own mothers and two such patients went through the experience of their own births, with dramatic and characteristic pains and movements.

Illustrative of identification with the mental image of the experience is the patient who saw two women as hallucinations, one middle-aged, large, coarse, dressed in an unpleasant and untidy purple dress, and having a revolting smell. The other was a beautiful woman dressed in the style of the French court before the revolution. She alternately became both of these women, seeing herself at first as a loathsome harlot and then as a wished-for lady of beauty, elegance, and position. This experience agreed well with her biographical details and helped her greatly to understand her position. Another patient's experiences were at one stage concerned with snakes. In several experiences she became the snake and had many interesting and revealing adventures while thus transformed. In her mind, this particular snake lived in hell. When she entered hell she became the snake, becoming separated from it again when she emerged.

Projection Phenomena

In several cases identifications have been projected, the patient believing that the doctor is his own father and that the ward sister is his mother. These patients have had phantasies of scenes of tension, disharmony or affection occurring between doctor and nurse in which the doctor and nurse assume the role of the patient's father and mother. These phantasies have been of the greatest value in helping the patient to work out his relationship with his own parents and are in fact frequently recognized by him as forgotten episodes of his own experience.

The projection of images on to the people present may extend to the room in which the treatment takes place. For example: "I was imprisoned in a cell, and the walls kept closing in around me. I felt so desperately unhappy in this cell and yet could not put my thoughts on one particular thing that was making me unhappy. The only way out was through a dark tunnel. How I can get through this tunnel I cannot fathom. I wondered if there were stairs, or if I just fell headlong, but I know I must make an effort to go through. I felt too weary and wondered if it was worth the effort. I had an iron band round my head and heavy chains on the back of my head and shoulders. There was so much unhappiness in this that I never want to experience anything like it again. The day after I felt very exhausted and edgy but was very determined that I will get through that tunnel whatever it may represent and whatever the effort." The patient had the treatment in a single room and described the tunnel as opening through the wall to the left of the door and in line with her bed. Turning of the head and body did not alter the apparent position of the tunnel.

The Reliving of Repressed Personal Memories

This aspect of the effects of LSD 25 will be described in some detail, as it is of the utmost importance, for the drug appears to be unique in that the recovery of repressed childhood memories is associated with a *change of body image* so that the patient feels he is transformed into the child he was at the time of the traumatic experience. He can accurately describe the age at which he feels himself to be, and relives, with extraordinary clarity, events of emotional significance which occurred at that age. The age may be constant during any one treatment but sometimes a steady regression to two or three years of age may take place. One patient remained apparently at the age of 8 or 9 for nearly two weeks. During this time, much of which was spent at home, other people appeared to be much larger than she was. She went through what appeared to her to be an identical period of her life at that time; her home becoming her school by day and her childhood home by night, with her own children assuming the role of her old playmates.

Another patient, a woman of 29 years of age, became a child of 5 or 6 years of age in the LSD experience. She felt that her clothes were huge and hanging loosely about her, and when the doctor grasped her hand his hand seemed large, as an adult's hand would to a child. In a series of experiences accompanied by intense emotion, she relived sexual assaults on her by a man during her childhood. She described a wood near her home where one of the incidents had taken place, even seeing the floor of the room apparently carpeted with wild plants and flowers. At the climax of this abreaction she told how the man repeatedly threatened to kill her if she told anyone about the occurrences. These events had been completely repressed but their emotional content was expressed in adult life in severe obsessional washing of the hands and genital region.

The following account describes in the patient's own words the recovery of a repressed childhood memory. The patient was a young married woman with great fears of sex, particularly of pregnancy, manifested as a fear of hurting or killing children. After 400 gamma LSD she wrote the following:

> "The reaction to last Friday's treatment seemed to follow a different pattern. Instead of the usual feeling of mounting tension until a state of panic is reached, I remained quite calm . . . when the reaction came it was sudden . . . Between spasms of difficult breathing I tried hard to think of a reason; slowly the feeling of someone being behind me began to develop; there was only a wall behind me; nothing touched me and I saw no one, it was only an atmosphere. During the next spasm the feeling of someone behind me was stronger. I began to feel anxious about my legs, it was an odd abstract anxiety . . . I felt under the pillow for my handkerchief, it wasn't a handkerchief, but a hand. I jumped up and looked behind me but of course there was no one there and it was my handkerchief I held. Another spasm of gasping followed with the strong feeling that someone was behind me. I think it was about then that I realized that I was reliving an incident that occurred when I was quite small, on holiday at Bournemouth. I wondered if I had gone small and was not the least surprised to see my hand and arm quite little, the size of a child of seven or eight. I don't remember feeling a different size but when I looked I had shrunk. This was the first time I had gone small under treatment. It seemed to me that I was shopping with mother in a large store in Bournemouth. She had walked on without my realizing it and when I turned to speak to her I was alone and lost. I stayed where I was and turned to look at the counter beside me. Suddenly I felt someone

behind me. I repressed an urge to cry out in case it was someone playing a joke. Although I do not know exactly what happened I think he must have put his arm round my throat, I was unable to turn my head to see who it was. I was shocked to feel his hand on the inside of my thigh, but could only imagine he had chosen an odd way to take my purse." Then followed a description of the interruption of this peculiar assault by a passer-by, the escape and capture of the man, his wild and insane appearance, his struggling wildly and finally escaping again.

The body image may change during experiences in which there is no reliving of repressed memories. Thus the hands may appear to swell and look huge and ungainly in a case of masturbatory guilt. A young man who had a desire to change into a girl felt himself actually changed into the female form, acquiring breasts and losing his penis. There may be sense of coldness or heat, or of the body being immersed in water, or of tears running down the face.

Not all repressed material belongs to childhood and not infrequently patients have recalled forgotten memories of their *adult* life. The following is an account of an LSD experience by an obsessional neurotic of 44 years of age who had had severe obsessional fears for the previous 2 years. This memory of her father was significant as his death appeared to precipitate a longstanding latent neurosis.

> "I was icy cold, but found myself in my colour world again which dissolved itself into a fishing village, Eckington, near Pershore. I was sat in a deck chair. I held my sun-glasses and by my side on the grass I could see my wide brimmed hat, a book and my knitting bag. I can remember looking all round, seeing the cows quietly grazing, admiring the deep green of the grass, lifting my eyes to the sky, seeing the deep blue and white flecked clouds. My eyes travelled to the other side of the river. I was appreciating the beauty of everything. I then dropped my eyes and standing about 4 yards away was my father with his fishing rod in his hand. He turned around and smiled at me. I could see his face in vivid detail. Two or three yards away stood my husband but he was intent on fishing so I could only see him side-faced with an old sports jacket and a very battered trilby hat on and smoking his pipe. The sun was shining and the whole scene peaceful and lovely. I returned to consciousness to find it snowing, but all the rest of the day and actually ever since that picture has remained with me as something too precious to part with because my father died just before my illness. That is three years this year, and owing to his illness we hadn't fished for some two years but since I have been in this hospital I had forgotten that we had ever gone and yet it had formed part of our summer week-end to spend a day fishing on Saturday or Sunday."

Occasionally, particularly in obsessional patients, an intense forgotten experience is not, at first, consciously "remembered" although the "memory" is lived out and dramatically experienced. In these cases the memory has been so deeply repressed and detached from consciousness, that it cannot be recognized initially when brought out by LSD 25. Frequently such a memory is then gradually brought out in serial form, each treatment bringing further details into consciousness.

We have been greatly impressed by this surging up of repressed experiences which has caused some of the most intense abreactions we have ever seen but it would be a mistake to suppose that all such experiences bring about an immediate cessation of neurotic symptoms. Obsessional neurotics, in particular, may be made worse for a time. For these patients, in whom the mechanism of repression is so strong, everything depends on whether they can come to terms with their repressed memories as they emerge into consciousness. This is not always possible, but we can definitely claim that LSD 25 is of the greatest value to the classical obsessional neurotic. Provided treatment is sufficiently prolonged, our results suggest that most cases will be relieved or cured.

The Appearance of Impersonal Unconscious Images

The emotion associated with the appearance of these images may be of the greatest intensity. There is normally a manifestation of only one image at a time and one such image may occupy and form the material of successive treatments lasting over several weeks. This material may also manifest itself in the dreams occurring between treatments.

Two remaining phenomena of the subjective LSD will be considered briefly—*depersonalization* and *the detachment of the conscious self:*

Depersonalization

In connection with changes in the body image depersonalization may occur. Some degree of depersonalization probably occurs during every LSD experience and is of a temporary nature, but severe and alarming depersonalization may occur. The phenomenon when fully developed corresponds to the syndrome described by Shorvon and others and is not confined to any particular neurotic entity but it is probably more severe in prognostically unfavourable cases. Indeed, patients who are improving on the treatment tend to experience the reverse process between treatment days. Many start to become aware of themselves as real people having separate identities for the first time in years, if not in their whole lives.

The Detachment of the Conscious Self

The detachment of the conscious self, a sort of detached ego, occurs very frequently and is characteristic of the treatment. This self is in touch with reality and looks on at the self experiencing the psychic phenomena. This phenomenon, which has already been described under "Objective Findings", is not confined to LSD experiences. Certain patients undergoing deep analysis and closely in touch with or actually in danger of being overwhelmed by the unconscious may undergo similar experiences. One such patient seemed to live in two worlds and to be two persons, both identical, but the one was seeing things in reality and the other was observing a world greatly changed and distorted by psychic events.

In practice there are no definite indications by which the probable type of reaction of LSD in any particular patient can be forecast. Some patients may be plunged immediately into the most disturbing symbolic experiences, only later coming to examine their personal material. Early release of this impersonal material needs much more careful handling and is an indication for caution in treatment. In other patients little response beyond indefinite fear, a sense of mental disturbance and non-specific hallucinatory appearances may occur for several treatments. If these cases are persevered with eventually a sudden release of personal memories takes place after which there is no difficulty in obtaining material.

We may now summarize the action of LSD 25 in the following terms. The patient at first experiences a sense of lightness or withdrawal from reality, followed by, or accompanied by a symbolic disintegration of the real world; the walls of the room become fluid and changeable, the blankets become "moth-eaten", the body is distorted, images of dismembered or partially whole objects appear. There is a sense of depersonalization, or of division of the personality, the conscious watching the unconscious. In contrast to this decay of reality the patient's vision of the unconscious is solid, vivid and dynamic. Just how this remarkable drug in such minute doses produces this shift of the central point of the personality towards or into the unconscious is not clear. That it does so is beyond doubt, however, doses of between 20 and 50 gamma of the drug being effective (1 gamma=0·001 mgm.).

COMPARISON OF LSD 25 WITH OTHER DRUGS

Mescaline

Splitting of the personality, one part of which can observe the other, time disturbances, depersonalization, and hallucinations which are manifestations of the unconscious are phenomena produced by both LSD and mescaline. The content of the hallucinations after mescaline is always in line with the subject's experience and one of Stockings' patients saw mythical personages and monsters of his childhood phantasies. "The mescaline psychosis represents a tremendous 'volcanic eruption' of the subconscious, with the repressing forces in complete abeyance, in which respect it appears to bear a close relationship to dream states" (Stockings (1940)). Mescaline, however, appears to induce a much greater state of intoxication than LSD 25 and the images and experiences are frequently of an expansive, wish-fulfilling type. LSD 25 on the other hand, allows the unconscious to manifest itself in a way which can be more easily dealt with by the patient. Memories in particular seem to flow up one at a time and wish-fulfilling phantasies are generally absent so that the question of addiction to the drug does not arise.

Insulin

Both under LSD 25 and during recovery from insulin coma the patient may feel that he is in a phantasy-world of timeless images while the external world appears plastic and unreal. Elemental experiences relating to birth, creative activity, death and the natural instincts are common to both treatments, but as the patients recovering from insulin coma seldom adequately describe their experiences verbally, many clinicians who have never specifically looked for them deny that they occur. LSD differs from insulin in that it enables repressed material to be released in a setting of clear consciousness, while in insulin treatment such material is released at the expense of consciousness which has been inhibited by deficient carbohydrate metabolism. Unfortunately, therefore, the insulin experiences tend to be obscured by poor conscious control on the part of the patient and the rapid return to reality. Occasionally, however, they persist for several days and are then similar to LSD experiences, as the following example shows. The patient was a young married woman with two children who was normally vivacious and capable of deep feelings. She passed into a catatonic state after her husband started an affair with another woman. On recovery from her ninth coma she complained of feeling very cold ("frozen"). The blankets seemed like iron and she had to mould herself to their shape. After the next coma she felt she was made of marble, being rigid like a statue. Following the twentieth coma she commenced a great struggle to fight her way out of her psychosis towards reality. She felt warm after recovery and wished to make contact with the rest of the hospital. After the twenty-fourth coma she repeatedly called out "I am not marble, not marble" and she started moving her finger joints to assure herself that she was real and alive and "not marble". Then she became frenzied, making bicycling movements with her legs and ran her fingers through her hair—"there are one or two knots of marble still left", she said. She then feverishly searched for lipstick and a mirror, covering her lips with lipstick "before it is too late". This was done to make herself human and to assure herself that she looked human. Later in treatment she thought of the treatment as bringing about the development of natural sexual instincts in her, tending to make her a harlot and thereby inducing a state antagonistic to monogamic marriage. She eventually made a complete recovery and returned to her husband, who, in the meantime, had given up the other woman.

The differences between LSD and insulin treatments are considerable but they have in common this experience of mental images which epitomizes the psychological position of the patient and in which there is an experience of the unconscious. In both treatments this experience of the unconscious may take the form of a regression to childhood or of a direct experience of the impersonal unconscious. The regression induced by insulin is of a non-specific kind as a rule, whereas LSD 25 seems to take the patient to specific periods of childhood and enables him to relive events as if he were of that age.

Thiopentone and Methedrine

These drugs assist the release of emotional material by dissociating conscious inhibiting processes from inhibited zones of consciousness and from lightly repressed memories. Their action is not comparable with that of LSD, which produces a specific activation of the unconscious which is responsible for the disturbance of the conscious mind. Clinically, the evidence suggests that the barbiturates are antagonistic to LSD, as a small dose of sodium amytal will stop the LSD experience when the dose of LSD has been small. After larger doses of LSD a small dose of a barbiturate, while not entirely halting the experience, reduces the tension and anxiety occasioned by it and helps the patient to verbalize the experience at the time. There is more doubt about the relationship between methedrine and LSD, but our experience so far suggests that methedrine disturbs the psyche at a very superficial level.

The Theory of LSD Treatment

Until further pharmacological and biochemical research has been carried out any ideas about the mode of action of LSD 25 must remain largely speculative. We do know, however, that it produces profound mental changes in minute doses and that there is always a time interval between absorption of the substance into the circulation and the onset of its effects. We consider that the drug primarily disturbs the unconscious and that subsequent phenomena depend on the result of the action of the unconscious on consciousness so that they are bound to vary from patient to patient. This view, we believe, is supported by the variable nature of the drug's action as shown by the following:

(*a*) The patient's day to day response to the same dose of the drug may vary considerably. 100 gamma given on one day may produce the most dramatic upsurge of unconscious material. The same dose repeated the following day may be without effect.

(*b*) On days when the drug produces symptoms the time interval between ingestion of the drug and the appearance of symptoms may vary in the same patient from twenty minutes to several hours.

(*c*) Whereas usually the effects of the drug pass off in about eight hours, these effects may last continuously for 10 days.

(*d*) The effects of the drug may be intermittent in duration for periods up to 8 days, symptom-free periods alternating with periods up to a couple of days during which the typical LSD experiences are present. These delayed reactions can be quite as violent and as disturbing to the patient as the reaction which normally follows the administration of the drug.

These phenomena cannot be correlated with the mode of action of, say, a basal narcotic, a given dose of which will rapidly produce narcotic states of fairly constant degree and duration on successive occasions. It seems unlikely that LSD 25 can act directly on any part or parts of the brain in this manner unless one is to postulate extreme variability of metabolism of the drug in different individuals and also in the same person on different occasions. It seems more likely that LSD 25 has one mode of action in all patients and that its function is to disturb the interaction of unconscious and conscious mental processes thus setting in motion a train of psychic events the course of which is determined by the patient's own psychological milieu.

As we know practically nothing of the localization, if such exists, of the unconscious, we cannot speculate further, but recent work by Ross Ashby (1952) and others suggests that personal memories can be stored in the brain up to a total of about 1,000 million separate memories and that they may be carried on chemical structures of the same order of size as that of the gene. That chemical action can evoke forgotten memories may probably be deduced from the fact that the emotional experience is the best "recaller of the past" and we know that all emotional experiences are accompanied by chemical change. It may, therefore, be that LSD 25 acts upon the genes or similar structures and this interaction results in the release of repressed memories.

CLINICAL MATERIAL OF PRESENT INVESTIGATION

Selection of Cases

The literature suggested that LSD 25 might give the patient access to his unconscious mind and for this investigation we therefore selected patients whose mental life was characterized by a more or less complete separation from causative memories and from the inner psyche. Such a separation results in mental tension, states of fear and anxiety characterized by preoccupation with symptoms, the various forms of obsessional neurosis, neurotic depression, a sense of futility and a lack of purpose and direction in life.

In order to ensure that any improvement in the patient's mental state which followed the treatment was in fact due to treatment only, all of our early cases were either severe obsessional neurotics with a bad prognosis or were patients who had been ill for a considerable time and who had previously had prolonged treatment either by psychotherapy or other means without improvement. Some of these latter patients had been treated by ourselves, the remainder by other psychiatrists. We would stress that we regarded all our cases as being very difficult psychiatric problems and that they were all in danger of becoming permanent mental invalids, life-long neurotics or of ending their lives by suicide. The outstanding symptom which has been present in all our cases is that of *extreme mental tension* and the majority of our cases would have been considered suitable subjects for rostral pre-frontal leucotomies.

Duration of Illness

The following omnibus table illustrates the chronicity of most of the cases in the present series:

TABLE I

Duration of Illness of Cases in Present Series

Duration of Illness in years	No. of Cases
0–2	9
3–5	7
6–10	12
>10	8

Diagnosis of Cases Treated and Results

The following table shows the diagnosis of the 36 cases we have treated and the results of the treatment to date.

TABLE II

Diagnosis, Average Number of Treatments and Results

Diagnosis	No. of Cases	Patients who have completed treatment								Patients still under treatment				
		Recovered		Greatly Improved		Moderately Improved		Not Improved		Improved		Too early to assess result		Refused after one treatment
Obsessional Reactions	6	2	*9·5*			3	*2*							
Classical Obsessional Neurosis	3	2	*40*							1	*34*			
Tense depressive reactions in young patients	4	2	*5*							2	*17·5*			
Older depressive patients	2	2	*7·5*											
Older depressive patients with epilepsy	1	1	*6*											
Anxiety Neurosis with great mental tension	12	2	*11·5*	1	*3*	1	*1*	2	*5*	6	*13·6*	1	*6*	
Psychopathic personality with depressive features	2	1	*2*							1	*12*			
Conversion hysteria	4	1	*9*			1	*3*			1	*16*			1
Homosexuality	1	1	*3*											
Schizoid Personality	1					1								
Total	36	14	*10·4*	1	*3*	6	*2*	2	*5*	11	*18·6*	1	*6*	1
		23								12				

The figures in italics indicate the average number of treatments the particular groups of patients received.

At this present stage of our investigation we do not wish to draw too definite conclusions from the above results, but the following observations appear justified.

(*a*) Of 3 classical obsessional neurotics, 2 recovered after an average of 40 treatments. In view of the notoriously bad prognosis of this condition we consider that LSD 25 would represent a major therapeutic advance if it were effective only in this type of neurosis.

(*b*) Conversion hysterics (1 case recovered out of 3) appear to do badly, but these cases were treated early in our series and the amount of treatment given may have been insufficient.

(*c*) Only 1 patient out of the 36 in the series has so far refused treatment and in this case refusal to continue was after one treatment only. This is noteworthy in view of the intensely unpleasant nature of many LSD experiences—as one patient described his first treatment, "It was the most soul-searing experience I have ever had."

Duration of Illness and Number of Treatments Required

The following table is restricted to patients who recovered or were greatly improved after treatment. It indicates that generally speaking (our figures are, of course, too small for statistical analysis) that there appears to be no relationship between the duration of the illness and the number of treatments required to effect recovery or great improvement. Patients who have been ill for up to ten years have required only a small number of treatments.

TABLE III

Duration of Illness and Number of Treatments required for Recovered and Greatly Improved Patients

Duration of Illness in years	No. of Cases	Total No. of treatments for each Patient	Average No. of treatments for duration group
0–2	4	12, 11, 3, 6	8
3–5	4	58, 3, 9, 3	18
6–10	5	3, 5, 14, 5, 2	5·8
>10	2	22, 8	15

Duration of Illness and Result of Treatment

Table IV, restricted to patients who have completed treatment, shows the relationship between the duration of the patients' illness related to the results of treatment. It indicates that unlike other treatments, LSD 25 is almost as effective in patients who have been ill for up to ten years as it is in more recent cases.

TABLE IV

Duration of Illness and Results of Treatment

Duration of Illness in years	Recovered	Greatly Improved	Moderately Improved	Not Improved
0–2	4	—	1	—
3–5	3	1	—	—
6–10	5	—	2	—
>10	2	—	3	2

Previous Treatment

Of our 36 patients, 20 had previously received a considerable amount of treatment of various kinds before being given LSD 25 and we think it reasonable to suppose that all of these would at best have been left with chronic neurotic disabilities had they not received LSD 25 therapy. Fourteen of these patients have recovered, 3 have shown moderate improvement, 2 are not improved and in 1 it is too early to assess results. Our limited experience suggests that pre-frontal leucotomy and recent E.C.T. render treatment more difficult.

Rehabilitation

It seems almost certain that a more or less prolonged period of mental rehabilitation will be required after the course of treatment by LSD has been concluded. The patient may be tempted to make major alterations in his environment and way of life during the more disturbing phase of treatment. It is wise to allow the patient to make at least some experiments in readjusting his life but any major alterations, particularly where these involve the question of marriage, marital separation or divorce, should be decided on only after the LSD phase of treatment has been concluded. We have found that about one-half of our cases required extensive rehabilitation involving the establishment of a new set of conditioned social responses.

Summary of Clinical Impressions

Our clinical impressions have convinced us that LSD *when used as an adjunct to skilled psychotherapy*, is of the greatest value in the obsessional and anxiety groups accompanied by mental tension. *We cannot emphasize too strongly, however, that the drug does not fall into the group of "physical" treatments and that it should be used only by experienced psychotherapists and their assistants.*

We would also stress the necessity for continuing treatment for some considerable time before deciding that it is of no value in any particular case. Unless there are contra-indications, such as the threat of psychosis, one should persevere for at least six weeks and for six to eight treatments before stopping. Many patients only start to produce material of value after 4 to 5 treatments at say weekly intervals. Patients who have suffered symptoms for years, as very many of ours have, cannot usually be cured in a few weeks, and we believe that it may be necessary to continue treatment for six to twelve months in some cases.

The Practice of LSD 25 Therapy

In-Patient and Out-Patient Treatment

We have found it desirable for patients, whenever possible, to commence treatment in hospital. It is our practice first to see the patient at an Out-Patient Clinic on four or five occasions so that as complete a history as possible can be obtained and rapport established with him and also with his relatives. He is then admitted to hospital for from two to four weeks. During the first few days in hospital he is given simple psychotherapy under pentothal to introduce him to the idea of drug-assisted psychotherapy. During the ensuing week he receives LSD on two or three occasions. The initial dose is usually 25 gamma and at subsequent treatments the dose is gradually increased until an adequate reaction is obtained. Thereafter the drug is continued at approximately weekly intervals. At the end of two to four weeks from admission, the nature of any particular patient's reaction to LSD will have become apparent and a decision can then be made whether it is advisable for the patient to remain in hospital for the rest of his treatment or whether he can continue as an out-patient. In the latter case it is often desirable for the patient to remain in hospital for the night following each subsequent treatment.

Where the patient is unable to enter hospital and can only be treated as an out-patient he should attend as early as possible in the morning and be prepared to stay until the evening. Where relatives are co-operative and intelligent, out-patient treatment may sometimes be preferable and several of our patients have been able to work out their unconscious material more easily in the presence of their relatives. One patient is at present taking the LSD himself at his home on his rest-day each week with satisfactory results, but the nature of his reaction was first determined in the hospital.

Within the hospital a carefully prepared environment and a well trained nursing staff are essential to the success of treatment, and we would strongly deprecate the giving of isolated doses of LSD to individual patients in an unprepared environment. It is desirable to have a group of patients and a team of therapists.

The Professional Team

The treatment unit should be under the care of a psychiatrist who is thoroughly versed in the theory and practice of psychotherapy. His assistants should have a clear understanding of the principles of psychotherapy and case conferences should be held regularly. Each unit should have a senior male or female nurse in charge who clearly understands the nature of the treatment and its probable effects and this nurse should have some elementary knowledge of psychotherapeutic theory and practice. Other nurses should be chosen for sympathy and tact, and need not be specially trained in the theory of the treatment. Part-time nurses are very suitable in this connection as they are usually available during the greater part of the daytime and many of them are married women who have had experience of mental nursing prior to marriage. Frequent changes of nursing staff are undesirable and nurses' duties should be arranged so that one nurse can remain with or near each patient for considerable periods during treatment. The psychiatrist should periodically meet the members of his nursing staff as a group to discuss the treatment. The written instructions issued to the nursing staff at this hospital are given later in this paper.

Medical Visits

Analysis of our own figures shows that each patient occupies about 1½-2 hours of the doctor's time each week. The doctor should be prepared to visit the patient occasionally during the whole of a treatment session and to spend up to one hour with him while the reaction is at its height. Not all patients require this, and some merely need encouragement and observation at this time as they prefer to describe their experiences afterwards. An evening visit often finds the patient more relaxed and in a position quietly to talk over the events of the day. A further talk on the following day and for as many days after as necessary will draw out additional psychic happenings and will help the patient to make the best of his material.

Role of Nursing Staff

The nurse's role is one of the most difficult to play. She has to understand and yet not comment on the patient's experience; she must not trespass on a delicate situation with bright and diverting remarks; she may answer but not ask questions; she must be prepared to be at the patient's side if needed and to play an intuitive, passive, vigilant part.

The Environment

The patient should lie or sit on a bed in a single room from the commencement of the treatment until the more disturbing psychic effects have subsided, usually sometime during the afternoon. The room should be simply but tastefully furnished and the walls should be of an even non-stimulating colour. Normally, the door of the room should be left closed so as to exclude extraneous noises. It is important that the general atmosphere of the treatment unit should be as quiet and calm as possible.

Group Therapy

The purpose of group therapy for LSD 25 patients is to provide an organized centre where patients can exchange information about their LSD experiences; be helped to work out their emotional problems in the presence of other people; be given any instruction they need regarding the nature of the treatment and where the doctor can learn something about the atmosphere of the wards where the patients are living. It is probably better for the group therapist to take a group of patients whom he is not treating individually, as otherwise the group expends a great deal of energy in sterile rivalry for the attention of the therapist. The dramatic effects produced by LSD 25, together with the natural fascination of the unconscious, make it the most discussed of all treatments. This discussion can proceed to the point at which it becomes a group neurosis, but the "LSD family" should live together in one ward, and the two sexes should have opportunities to meet in a hospital canteen or whilst on parole for discussion. Although hostile feelings have sometimes been aroused between patients, many patients have been of the greatest help to one another. The whole question of the group relationships involved in this treatment requires further study but it is clear that the group life of patients on LSD 25 must be watched very closely.

Individual Work by the Patients

We ask the patients to write a full account of each LSD experience during the two or three days following treatment. This is most important and helps the patient to recapture many points which might otherwise be lost. We also ask the patients to comment on and interpret their own experiences. The patients are also asked to draw or paint the more telling phantasies and several very interesting pictures have resulted.

Presentation of LSD 25

LSD 25 is at present put up in 1 c.c. ampoules, each containing 100 gamma of the drug in solution. The prescribed dose of the drug, which usually varies from 25-400 gamma, is mixed with one ounce of water and given by mouth. No advantage is to be gained by administering the drug intravenously, as its effects when it is given by this route are the same as when it is given orally. If breakfast is taken at 8 a.m. the LSD 25 can conveniently be given at 9.30 a.m.

Instructions to Nursing Staff

We give now the instructions we issue for the guidance of our Nursing Staff.

Instructions to Nursing Staff for Patients Receiving Treatment by LSD 25

General

The purpose of giving the drug known as LSD 25 is to produce an altered mental state in the patient enabling him or her to recall past memories and experiences and also to undergo a direct experience of mental images of great value to the patient. These mental changes are usually felt by the patient as feelings or visual impressions and may be accompanied by strong emotional changes and considerable distress. The drug is given by mouth and the reaction is at its height between one and two hours after administration.

The reaction may continue for several hours, and may persist in a recurring but less severe form for several days; ten days being about the longest time for such reactions to occur. During the day of treatment the patient requires quiet surroundings, a single room being ideal for the purpose and may need much help and understanding from the nursing staff.

Preparation of the Patient

No special preparation is required. The patient should be told at least the day before that treatment is to be given. This is important. Any physical complaint by the patient should be reported to the doctor before treatment is given. The patient should be allowed the usual breakfast before treatment.

Administration of Drug

The LSD 25 should be given by mouth at the prescribed time in about an ounce of water. This is best done by drawing the required quantity of LSD 25 into a syringe and mixing it with water in a medicine measure.

Management of the Patient under Treatment

The patient should be allowed to lie on a bed in a single room as soon as the drug has been given. Reactions may be expected after twenty minutes. They increase in steps until the maximum reaction is reached some 1-2 hours after administration. Once the patient is in his room he should not leave except for toilet purposes until the reaction has passed off—usually some time during the afternoon if the LSD 25 has been given in the morning. Patients may be allowed water at any time if thirsty or a cup of tea later in the treatment. Few patients have any desire for food during the reaction and food should not be pressed on the patient. If the reaction becomes severe, or the patient desires it, the doctor should be sent for. It is desirable for the sister or a nurse to be present during the whole of the "reaction". The nurse may either be nearby or may sit with the patient. Most patients need this human contact more as a necessary link with reality than as a sympathizer with their distress. Crying out, emotional weeping or outbursts of screaming or shouting may occur and should not be discouraged. The patient may desire to talk. Specific enquiries about the nature of the mental disturbance should be made only at the doctor's request but the patient's questions may be answered as the nurse thinks fit. Occasionally patients prefer to be left alone, knowing only that the nurse is nearby. It should be borne in mind that the patient is in a heightened emotional state and that he becomes easily upset or disturbed, and that he may project his mental problems on to the staff in a way that must not be taken personally.

After-care

The patient may require a sedative after several hours of an exhausting emotional experience. Nembutal grs. 1½-3 is most suitable for this purpose. No special observation is required as a rule, but if a patient seems unduly disturbed, depressed or alarmed the doctor must be informed at once. Fears of insanity and suicidal tendencies may occur and vigilance must be observed for the latter possibility.

Patients are asked by the doctor to write, paint or draw their experiences and facilities should be given for this purpose.

Patients should resume their normal occupations on the day after treatment, but a patient anxious to work out his experiences without the distraction of work may be allowed to do so, the permission of the doctor being sought for this purpose.

Parole, if normally granted, may be resumed on the day after treatment, the doctor being reminded of this on the morning round in case he wishes to stop parole for that day.

Delayed reactions may occur, and may be as severe as the original reactions.

Out-Patients

The same general rules apply to out-patients. No patient must be allowed to depart from the hospital unless in the care of a responsible person. This person should be told to get in touch with the hospital by telephone in the event of any undue anxiety being felt by the patient. Some out-patients may be kept in the hospital for the night on the order of the doctor.

SUMMARY

The results of an investigation in which Lysergic Acid Diethylamide was given to 36 patients suffering from psychoneuroses and allied conditions are described. After a brief review of the relevant literature the effects of the drug from the observer's and patient's points of view are dealt with and emphasis is laid on the property possessed by the drug of disturbing the unconscious so that repressed memories are relived with remarkable clarity and a change to an infantile body image. The theory is advanced that LSD 25 exerts a selective action on the genes which may be the "seat" of repressed memories. Results of treatment in the 36 patients are then described and the paper concludes with a detailed account of the authors' technique of treatment.

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PSYCHOLOGICAL ASPECTS OF THE LSD TREATMENT OF THE NEUROSES

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Recent work by the author and his colleagues (Sandison, Spencer and Whitelaw, 1954) has established that lysergic acid diethylamide is of great value in the psychotherapy of the neuroses. This paper attempts to examine in rather more detail the possible mechanism of action of the drug in terms of dynamic psychology. It is now generally accepted that the psychoneuroses are the result of a faulty relationship between the conscious and the unconscious, leading to a one-sided or prejudiced conscious point of view. Any discussion which follows this observation must be preceded by a definition of the writer's conception of the unconscious, and in this paper the standpoint adopted by Jungian analytical psychology will be preferred.

It was noticed quite early in the therapeutic experiments with LSD that many of the LSD experiences were personal ones for each patient, and that they were intimately connected with the patients' psychic problems. Later, three types of LSD experiences were recognized. First, generalized non-specific images such as a sense of lightness of the body, changes in the surroundings giving them plasticity and fluidity, the appearance of coloured patterns and other hallucinatory experiences of a non-personal kind. Second, the recall and re-living of forgotten memories and experiences of childhood. Third, the experiencing of archaic, impersonal images in terms of images or hallucinatory pictures exactly similar in nature to those experiences of the collective unconscious which patients undergoing deep analysis experience in their dreams, visual impressions and fantasies. All these images are, moreover, felt with a degree of vividness and a sense of certainty concerning their reality and personal importance which is remarkable and convincing. Furthermore, these more primitive LSD experiences are accompanied by a sense of their agelessness and timeless quality which is the hallmark of the great archetypes of the collective unconscious. It should be noted that these experiences can occur independently of any previous analytical treatment. The manner in which LSD can enable patients to re-live forgotten childhood memories has already been described, and there is no doubt in the writer's mind that in many cases great benefit can be derived by helping the patient to come to terms with his repressed emotional life at this level. There are, however, almost always other factors behind these traumatic episodes, and one need hardly mention that the current emotional life of the patient must also receive careful examination. But the factors which have originally conditioned the patient to neurosis and may have caused him to relapse into neurosis again, even after abreaction to psychologically traumatic episodes, are to be found in his conscious relationship to the more universal aspects of the psychic life.

It is at this point that the problems of the psychotherapist begin. How shall he face the problem of taking his patients through a long drawn out process of coming to terms with and assimilating the unconscious? Some psychiatrists deal with the situation by the use of E.C.T. and other physical methods of treatment which, as the writer has already shown (1950), result in consciousness becoming cut off from the disturbing inroads from the unconscious. Others believe in helping the patient to make the best possible use of his existing psychic balance; social readjustment and supportive psychotherapy come under this heading. Many of these methods, including E.C.T., are remarkably successful in a large number of cases, and may keep the patient going for a number of months or even years. There are a large number of cases seen in an ordinary psychiatric out-patient clinic that are not truly helped by these methods. They include particularly the obsessional neurotics, young depressives who fail to respond to E.C.T. or who relapse within a few weeks, and numerous others whose problems seem so deep as to go beyond the confines of short methods of treatment. These, mostly, are the patients for whom a prolonged and expensive analysis would seem to be the best solution, and as things are at present, only a small proportion of these patients can ever hope to receive such an analysis. It is for at least some of these patients that LSD treatment may offer new hope.

The even more important question arises that, were it available, few of the patients described above would go through with a prolonged analysis. In so many cases the rigid conscious barriers and resistances offered by the patient are too great to be overcome. LSD gives these people some real and tangible experience of their own unconscious and re-kindles their faith in their own spirit at a comparatively early stage of treatment, and helps it to proceed more readily. This paper will describe two cases for whom little could have been done until LSD treatment showed them the contents of the unconscious and psychotherapy helped them to assimilate these. Their description will serve to illustrate the type of unconscious material obtained under LSD and will explain the writer's reasons for believing it to be an experience of the unconscious. It should be noted that the first patient had had E.C.T. four years before, and psychotherapy from another therapist for eighteen months prior to having LSD.

The first patient was a single girl, twenty-five years of age. She was an only child, brought up in a sheltered moralistic environment, both parents having narrow views. The family pattern, however, with the exception of her mother, was one of independence and sexual freedom. This girl's early adolescence was emotionally stormy, the practical implications of which she was scarcely called upon to face, as she developed tuberculosis at the age of sixteen, but she became physically able to resume a normal life at the age of twenty. Almost immediately the problems of her love-life led her into severe conflict. She adopted a prim and virginal attitude towards her fiancé and soon began to be tormented by evil thoughts about him which amounted to a conviction that he was a murderer and that he would do her or someone else severe physical harm. These confusing thoughts led her to break off the engagement and thereafter she found that she would develop the same morbid thoughts about each man in whom she became interested. She became increasingly aware of a sense of frustration and emptiness in her life. She had long periods of deep depression and at the time of her admission to hospital, just before starting LSD treatment, she was on the point of suicide. She had previously attempted to counteract her evil thoughts by taking an active part in church life but she soon found that her very worst thoughts would come to her in church. There seemed to be no remedy. Eighteen months of psychotherapy had shown her that the problem was to come to terms with her own turbulent instincts but she saw no way of doing this. Such is the background of the early LSD experiences. These were dramatic and consisted of those archetypal universal experiences to which we have already referred. The most important of these images was the snake, which the patient recognized as a part of herself, but its behaviour was not under her control and the snake tended to behave autonomously, as the unconscious does when it is not accepted and integrated into consciousness. The third LSD (100 gamma) brought forth a series of experiences of which the following is her own written account. This writing was accompanied by thirteen illustrations which, unfortunately, cannot be reproduced here.

"Drug taken at approximately 9.30 a.m. Effects felt about twenty minutes later. I had the sensation as in my first LSD treatment of a snake curling up round me. I felt very sick and dizzy. I then began to see serpents' faces all over the wall—then I saw myself as a fat, pot-bellied snake slithering gaily away to destruction. I felt horrified and thought 'whose destruction?' I then realized it was my own destruction—I was destroying myself. I seemed to be having a battle between life and death—it was a terrific struggle, but life won. I then saw myself on the treadmill of life—a huge wheel was going round and round with hundreds of people on it. Some were on top going confidently through life, others were getting jostled and trodden on but still struggling to go on living (I saw myself as one of these people) and then there were others who just couldn't cope with life and were being crushed to death in the wheel. I had another realization of how I was destroying myself—by carrying on this affair with this married man—how all the better side of me was gradually being destroyed through carrying on this affair and I knew it must cease and knew that I must never see him again. Also when I was watching myself as a snake going to destruction I cried for the Doctor because I wanted him to show me the right road away from self destruction.

"The Doctor came in and asked me how I felt and I told him that there were snakes everywhere. I had the sensation of being right in the middle of them. The Doctor asked me if it was like anything I had experienced before. I said it was a dream I had had as a child. He asked me if I knew what that dream represented and I said 'sex'. He said 'What sexual feelings could a small child of that age be having?' or words to that effect and I said 'I don't know'. Actually at that minute I was right back as a small child with moving grass all round me and I could see snakes slithering through the grass. The whole atmosphere was as it had been when sexual incidents occurred with boys when I was about six or seven.

"I then had the feeling of being back in ancient Egypt lying at the bottom of a well with high walls round and Egyptian faces all round the walls and something hovering over me. I said to the Doctor, 'Something terrible is going to happen to me'—I felt as though a huge whitish snake was hovering over the top of me and might drop on me at any minute. Then I had the feeling that I was the Devil—I could see my long, pointed tail curling round the back of the Doctor. I thought, 'Poor Doctor, he doesn't know he is sitting with the Devil!'

"After the Doctor had gone I had a vision of myself in Hell—of being dragged out by chains—the Doctor and other people were pulling me out and I was very reluctant to come out. I had all sorts of queer dizzy feelings—of patterns and colours all whizzing round in circles and I felt very tired but also a sense of happiness—as though I had sorted out quite a lot of problems under this LSD. I again felt that this was the treatment for me and my only way back to normality, but I also felt the need and presence of God. I felt that although the Doctor was helping me to get well through LSD, we all needed God's help above anything else. I had a vision of life as a dark murky pool and saw myself dipping my toes in gingerly with first one man then another, of being urged on by some of them to go down into the pool with them but I kept drawing back—I just had to wait for the right man to experience the pool of life with. I felt very tired all day but extremely happy and I laughed a lot. Colours looked very vivid and beautiful to me as though I were seeing them clearly for the first time.

"I had the sensation of the jig-saw puzzle which I have had in each LSD treatment, but this time there were no pieces missing. All the pieces were there but not quite in line—it seemed as though it needed one jolt and all the pieces would fit in together and I should be well again. I thought, 'I had better have a dose of E.C.T. and see if that will shake the jig-saw into place'. I had a vision of myself and all my fears—I realized that I was afraid of being afraid—afraid of fear itself, which is surely much worse than being afraid of something tangible.

"I didn't sleep that night—about 1 a.m. I had another sensation of watching myself. I was out of Hell—standing on the brink and I was perfectly pure. I felt that I might be drawn back in again so I made myself run away. However, I was drawn back and looked down into Hell, and there was my snake still down in Hell. I jumped back into Hell—right into the snake's mouth and became the snake. Then I started the ascent out of Hell, but it was a terrific struggle—I seemed to be carrying a huge weight but I kept struggling to get out. Then I felt a snake biting my tail—then I realized I was biting my own tail and eating myself up. The struggle to get out of Hell was too great and I thought, 'Oh, well, it isn't such a bad Hell after all' and curled up in Hell and went to sleep."

These experiences present to the analyst all the fascinating problems of the serpent as one of the great archetypal images with all its accompanying mythological references and its deep significance in the human psyche. We are all familiar with the serpent in his two aspects, as the poisonous reptile and destroyer of man's relationship with God, on the one hand, and as the healing and regenerative principle on the other, as we see in the caduceus of Mercury and the use of the serpent in Gnostic rites.

The inferior, unconscious demoniac aspects of the serpent are well illustrated in the patient's account of the experience, and the moving adventurous nature of the fantasy is most important as it helped her to understand the nature of the archetype and her relationship to it. The identifying of the serpent with the negative guilt-laden aspects of sex is clearly seen. The experience of actually becoming the serpent is of great interest and shows how easy it is to become possessed by and identified with an archetype at which point the patient can only see things from the serpent's point of view.

The reference to E.C.T. is a reference to the fact that she had had 12 E.C.T. four years before starting treatment with LSD. Her comment on this is:

> "I . . . realized . . . that this awful nightmare was the state I had been in four years ago when I was so terrified I nearly committed suicide—I had 12 E.C.T.s and it did bring me out of that awful pit of horror, fear, and terror. It cut it off from my unconscious mind but it went on troubling me just the same."

Her wish to have E.C.T. again is probably a desire to avoid the unconscious, a wish to be made well from outside which is quite contrary to the need for understanding and accepting the unconscious which LSD or analysis demands.

The sensation of biting her own tail and eating herself up is of great interest also and occurred on other occasions. In the patient's position at that time this symbol merely represented a destructive fantasy and acted as a resistance. It might be regarded as akin to a masturbatory act, i.e. a sterile procedure leading only to worthless fantasies and on many occasions, particularly between treatments, this was just the impression that this patient had of her LSD experiences. According to Jung the "tail-eater" or Uroboros, either as a serpent or a dragon in mythology, is a redeeming symbol, mandala, or a materia prima of the alchemical process, and may be regarded as a protective device against the perils of the unconscious (Jung, 1953). In this patient at present there is a great desire to turn away from the unconscious, seen either as a fear of further treatment, hostility to the doctor, or seeking escape in many ways, none of which are likely to be a solution to her problems. Her comment on the value of LSD is that all her previous treatment (including eighteen months of psychotherapy) had given her an intellectual understanding of her problems but she had never seen any way of dealing with them. Under LSD she saw the problem as part of herself and could also see developments and ways of coming to terms with herself. She was able to make alterations in her life which she had never had the courage to do previously and in a series of dreams her immediate problems and certain aspects of her relationship to treatment were presented in a clear and concise form.

The second patient was a married woman of twenty-six years. The death of her mother at the age of twelve, a restless, psychopathic father, the failure of her marriage and other factors had led to a progressive severing of all human ties and emotional relationships until she was faced with despair and suicide. Almost the only remaining value in her life was her feeling for her dog. She had reached this desperate position despite many months of psychotherapy elsewhere before coming to our hospital. The problem of securing any sort of rapport with this patient, of enabling her to regain the spirit of life through contact with her own unconscious, and of helping her to bridge the gaps over the years beyond her mother's death into her childhood, was immense. Her early days in hospital were used by the therapist in an attempt to build up some feeling of hope through the transference and by the patient in working out purely intellectual reasons for suicide. Her argument was that she saw no reason for living, that it was her life to sacrifice if she wished, and that we had no right to interfere. During this period certain pieces of information were obtained which formed the background for the future material released under LSD. The first was a disturbance of sleep which had occurred since the time of her mother's death, in which she would become increasingly restless in her sleep, finally waking up screaming, "Oh, no, Oh, no" repeated many times. This was observed in hospital on numerous occasions. Next was an unreasonable fear of spiders. One of her pre-LSD drawings was a sort of man-spider, a repulsive representation of the animus, which the patient was at heart able to recognize as connected with her bad moods, although its character was usually projected on to her father, but sometimes on to her husband. Finally, the death of her mother had become an emotionless fact. "One day she was there, and then she was no longer there", but the patient did know that her religious beliefs and her faith in life had ceased from that time.

The first LSD was a dramatic affair, causing the most violent abreaction, accompanied by screaming and restless behaviour, the "Oh, no " cry being the only words that could be distinguished. This reaction occurred in frequently repeated outbursts. She did not know as yet the significance of this screaming. In that first day it seemed as if she passed back through her whole life. At lunch she appeared to be eating a dish of asparagus cooked by her mother. By tea-time she was a small child, keeping her food possessively to herself. Later she became still more regressed; she wished only to look at coloured pictures and finally became deprived of speech. This was followed by a fairly rapid recovery, and on the next day she felt exhausted, taut, and nervous. This experience, as were most of the others, was characterized by a great hunger or thirst, a craving for something. She knew not what this could be, but it was partly satisfied by drinking and inhaling deeply. Thus we see the beginnings of the recognition of lost emotions, the craving for mother love and the need for the life giving spirit. In this first experience she also met the spider, a huge, ugly, terrifying and menacing animal, quite out of her control.

Then followed many experiences of the spider of which the following is a fair descriptive example. "Flashes of a woman's face, I think my mother's. Continuous pictures of the four eyes of the spider and of complete spiders advancing upon me (coloured green and black) . . . Following this was a sensation of looking through a cavity—myself in shadow to the right, bright colours to the left, and through the cavity was peace and fulfilment. I struggled mentally to get through but could not. This was followed by another hysterical outburst. The spider never touches me but seems to want to enfold me and take me bodily . . . I remember thinking that I myself was the spider." The implications of that experience are very telling and not without signs of danger. The separation of the patient from consciousness, being herself identified with the shadowy unconscious realms ("myself in shadow to the right"), are compensated by the discovery of the cavity drawn by her as a mandala, which is clearly a centre of organization and "fulfilment"; the most dangerous element is the untamed autonomous spider which threatens to possess her completely.

This experience was followed by others in which a great deal was learnt about her relationship towards her parents and family. Her own commentary about the middle of this period was as follows. "As far back as I can remember, even into childhood, there has been something lacking in my life, no spark, a feeling of not really being here, incomplete. Since having my first LSD, at times, all of me has come alive, I have really lived and been aware of everything about me. I have been able to know and express my emotions, a great sense of freedom of mind and spirit." At about this time she realized that the "Oh, no " nightmare was a reaction to her mother's death, a denial of its reality which had become unconscious, so that the very idea of mother seemed unimportant. Finally came the revelation that the spider was in reality a mental function and that it could be a great source of energy and feeling if come to terms with. This is revealed in the following experience.

"Sometime after this I found myself inside a cell of my subconscious mind. It contained my spider, no longer alert and frightening and vivid, but tired, beaten and almost dead, it looked pathetic. With the spider there were thoughts and feelings and from these, the conscious person, myself, sitting on the bed, had to learn a lesson. It was a most peculiar sensation. I found that my conscious self 'A' was speaking to my subconscious self 'B'. 'A' was learning and speaking the lesson, 'B' was teaching it by sending out waves of thoughts and feelings. 'A' spoke the following words—'The love I felt'—at this 'B' sent a wave of pure love pulsing through my body—'The tears I shed'—a strong feeling of emotion came to my throat and tears to my eyes—'The pain'—with this a terrific weight on my body. At this point I got confused, 'A' substituted the words 'unhappiness' and 'burden' for pain, but 'B' did not seem satisfied with any of these words. All the above was repeated again and again, always getting confused at 'the pain'. Eventually I cried because I was unable to understand and learn my lesson. I came out of my subconscious and sat on the bed thinking about what had just happened. I realized that I had been in the cell of memory containing my mother's death, that in it were the mistakes I had made at that time and from it I could learn a very valuable lesson. I decided to try again, but though I tried with all my power of mind to learn the lesson, I could not, the words, feelings and meanings were all there but I was too tired to hold them together. I lay down and cried with disappointment and exhaustion. Later I realized that the room and everything it contained was dripping with tears, and that I was crying inside my throat though not from my eyes as it all had been earlier in the day. This continued until about four p.m."

She painted a picture of this experience, in which four circles are arranged in a square formation. Three of these circles are vague and unknown, but the fourth, which is the larger, is the "cell" of her mind referred to above. It contains the defeated spider, and it also is the place of tears, and no doubt represents the long lost feminine feeling function. The precise significance of the defeat of the spider was not clear, but it is probable that it represents a retreat on the part of the patient from possession by the spider-animus; she now becomes able to experience feeling and to relate herself to the events of her early life. She must not lose the spider, of course, but events to date do suggest the possibility of a better relationship to these archetypes. This particular LSD experience was also marked by a much greater control of the situation and this satisfactory ability to make the fantasies active, and to move amongst the unconscious images is one of the most useful properties that LSD may confer on a patient. One may compare it with the process of active fantasy so much used in analysis.

In our opinion one should aim at getting the patient to the point where he can actively influence the images produced under LSD so that he can consciously explore his mind and learn something from the great wisdom of the unconscious.

For some weeks thereafter the LSD experiences were concerned with the recapturing of the feelings surrounding her mother's death, in which the process of mourning was enacted in her. "The room became very bright. I was extremely weary, but felt peaceful in the presence of my mother . . . suddenly I became aware of myself kneeling on the bed crying. I could feel a pain in my heart and throat, and I could feel the tears running down my face."

These experiences helped somewhat, but the nightmares continued and she felt as far away as ever from her husband, and she still had aggressive and angry moods. At this stage she became interested in finding out something about her father, and the abreaction began to involve him deeply. In successive treatments she believed that he was strangling her and sexually assaulting her, and in particular that he was having oral intercourse with her. She could not say that these were actual memories, and they were most probably fantasies, but such behaviour towards her would be in keeping with his alcoholic psychopathic personality. Then, despite her ferocious antagonism towards him she began to feel as a little child, loving and adoring its father. In LSD 10 she described this feeling. "I thought I would rest and try to sleep. I lay there for some time, then I realized I felt like a small child curled up against its father, loving and being loved, warm and safe." The impersonal nature of this feeling is suggested in the next treatment (LSD 11). "I found myself under water. I thought how remarkably pretty this land of the unconscious was. Then the colours changed, the water became green and angry looking. I felt afraid . . . I found myself in a cave under water. In this cave or room was a tree and plants. I found myself crying because I loved my father, his presence was all round me in the form of a spider, but unlike the spiders of previous LSDs I was not afraid of it. I cried a lot and said how much I loved him, in spite of what he was—for a moment I was proud of him; then I was deeply ashamed of him."

Shortly after this, by one of those mysterious so-called "chances" that occur so often in analytical work, her father came to the hospital to see her. She had not seen him for some years, and neither appeared to have taken any interest in the other since shortly after her mother's death. His arrival put her in a most hostile and irrational mood, until she realized that she often felt like that in the presence of her husband. She spoke of being "humiliated" and "degraded" by having to see him. However, she persevered, and is now seeing him regularly. He, for his part, has gained some unconscious inkling of her need, and is content to come.

Her position with regard to the whole of this father-animus-spider image is, at present, a complex and ambivalent one. On the one hand she writes of her father as "this loathsome creature, unclean, dissipated, whose breath alone makes me vomit", while on the other hand she has the following dream.

> "I was in a cellar, it was clean, but bare and old. My father was there too. He invited me to go into the next room. I went in. It was a large kitchen with a red-tiled floor. Everything was bright, clean, and shining. There was a rack containing bottles of rare and valuable wines."

This dream suggests that in her father's house there is something of great psychological value to her. She has, herself, some notion of her confused position with regard to the archetype of the father, as she writes (LSD 16). "The huge and horrible male spider was there all round me. I began by being afraid of it . . . then I found I wasn't afraid any more, and that this choking sensation wasn't going to do me any harm. I wondered who was choking me, and felt it would be someone that I love. I thought that it was an odd way of expressing love. The spider was still with me. I cautiously looked at it and realized that I was a little nearer to it, as though I was sitting in its shadow. I didn't mind this, wasn't screaming at it, but wasn't sure about it either."

The further development of this situation will surely involve the question of the archetype of the father as god, and also, inevitably, the transference situation. But on the practical side she writes, "My one desire is to be a wife to my husband; this desire has grown stronger in the past weeks." At the time of writing she is spending a week or so with her husband for the first time for over a year. This development is remarkable in view of the desperate state her marriage was in, having drifted, over six years, into complete separation and impending annulment. All this has been accomplished in eight months and there seems little reason to doubt that this patient will completely recover and live a satisfying and consummate married life.

LSD Treatment and the Transference

The essentially analytical and psychological aspects of LSD treatment naturally give rise to all the transference problems of orthodox analysis complicated by the various mythologies which exist in patients' minds concerning the nature of physical treatments and the use of drugs in psychiatry. It is well known that many patients hitherto have thought they were having no treatment unless they were being given E.C.T. or insulin; that thiopentone is the "truth drug"; that hypnosis gives the doctor magical power over the will. Some patients at first found it difficult to get beyond the notion that they were being cured by a drug, and it may be that this partly accounts for the poor success of LSD in the psychosomatic disorders.

A variety of attitudes towards the treatment were expressed by patients. Some tended to use the feelings of fear and the disturbing experiences as a means of regressing to a childish state of dependence. One patient who had religious experiences under LSD thought that it was wrong to be using a drug to enter these spiritual realms. Some have thought that the doctor was exerting a hypnotic influence over them and this idea probably arises from the fact that the LSD experience is frequently accentuated or modified when the doctor enters the room. The doctor may also become identified with one of the images of the experience. Despite these difficulties the author has found that both positive and negative aspects of the transference are readily revealed and the nature of the experience is such that the patient usually has no doubt about its meaning. The meeting of resistances and hostility to the therapist are usually expressed by the patient as an objection to the drug itself. He will make it known that he thinks LSD treatment is no use, that he feels worse, or that he is leaving hospital at once. Despite these frequent assertions the remarkable fact is that so few patients give up LSD, once started. Provided the case proves suitable for this treatment, the great majority (35 out of 36 cases) have seen the treatment through and this can hardly be said of any other form of psychiatric treatment. No doubt the universal fascination of the unconscious is the deciding factor. Provided that the patient is not allowed to indulge in this fascination there is no difficulty in bringing the treatment to an end and in resolving the transference. At the weekly group meetings these transference problems have been greatly discussed.

Experience to date suggests that there should preferably be some rapport between doctor and patient before LSD treatment begins. In some cases however where no such relationship could be established the LSD treatment itself appeared to kindle the transference. Faith in self, faith in "LSD" and faith in the physician are clearly inter-related.

The patients in the hospital group are all aware that LSD is a new drug for assisting the unconscious to reveal its secrets and one has been most encouraged by the help they have given in the work of investigating its uses. Many patients have assisted at clinical meetings by describing their experiences or actually having the treatment for the benefit of other doctors. My thanks are due here to the many patients who have contributed to this work and I should like also to thank the two patients who have allowed their material to be used in the preparation of this paper.

Conclusion

An analytical survey of the material produced under the influence of LSD from the thirty-six psychoneurotic patients described in a previous paper has convinced the writer that it bears a striking similarity to the dream and fantasy material of patients undergoing deep analysis. The procedure of treating this material on analytical lines has here been described in two cases and the results of treatment in these two patients to date indicate a high probability of ultimate success.

It is sufficient at this stage to regard LSD as a drug which produces an upsurge of unconscious material into consciousness, and that this material is of great personal significance to the patient. We shall, no doubt, find many cases in which these experiences cannot be understood by the patient, and in them the treatment may be of no value. It is vital, however, that the material should be understood by the therapist, although the foregoing Jungian interpretation is not held to exclude other possible ways of treating the material. The writer, therefore, offers this contribution to all who are interested in the various methods of psychotherapy.

Acknowledgments

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AN EXPERIMENT IN SOCIALIZATION OF ADULT CRIMINAL MENTAL DEFECTIVES

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DURING the Spring of 1952 in the course of my work with adult male defectives, I made a practice of taking groups of them for walks and short cycling trips outside the grounds of the Institution. I decided it might be worth while to undertake a prolonged tour. In June, Dr. Curran gave me permission to take seven high grade defective adult males on a two weeks' cycling tour.

Through the good offices of Mrs. Morrison, a member of our Board of Management, contact was made with the Scottish Youth Hostels Association, who agreed to my taking these adult patients under a Youth Leadership Card, a privilege normally reserved for children. This saved the expense of the patients joining the Association. One of the male staff, Mr. McGill, volunteered to spend his annual holiday on the tour, and his wife, also a Mental Deficiency Nurse, and his two sons, Paul, aged 12 years and Donnie, aged 7 years came as well. Mrs. McGill and Donnie travelled by bus; the rest of us cycled.

The object of the tour was threefold:

1. To study first hand, the reactions of the defectives to a normal environment.

2. To widen their horizons. (The safest outlet for these boys is farming where they are less likely to meet the "spiv" city types who lead them into trouble.) I wished to show my boys that life could be enjoyed miles from Glasgow, their Mecca, and at the same time, I wished to observe how they could adapt themselves to rural surroundings.

3. To guard against the constant danger of Institutionalization.

The first problem was bicycles. I had bought one earlier in the year. Mr. McGill borrowed one for himself and bought a new one for Paul. In the Institution were five decrepit "Scout" bicycles. From these five we managed to make two old-fashioned but fairly reliable vehicles, but in the actual trip we did not require them. The Hospitals Auxiliary Committee gave one bicycle, Dr. Campbell another, three boys borrowed from relatives and two of the male staff lent theirs. Such disinterested kindness gave me new zest for the project.

I planned a circular tour to Inverness *via* Glencoe and the Great Glen, returning by Kingussie, Perth and Stirling. Dr. Curran arranged for food parcels to be sent by post to alternate hostels, and found sufficient funds.

Choosing the actual boys was quite difficult. They had to be physically healthy, non-epileptic and able to ride a bicycle and understand the rules of the road. They must not look outstandingly defective. They must be boys with whom I had personally worked and knew well, so that I could expect some degree of loyalty from them, and boys who would be likely to benefit by the trip. In my choice, I made one mistake—Charlie—fortunately without catastrophic results.

Their actual ages ranged from 17 years to 21 years with one "boy" of 32 years. Their mental ages ranged from 8 years to 10½ years. One boy had been admitted to the Institution because he was unmanageable under guardianship (Jock), the others for theft and housebreaking and only Charlie (admitted aged 15 years) had been admitted before 16 years of age. Joe the eldest had been in the Institution 14 years, Peter 4 years and the others 2 years.

PERSONAL HISTORIES

Jock—M.A. 10½ years. Actual age—17 years.

Jock has a tragic history; he is illegitimate, his mother dying when he was one year old. His putative father, already married and with a family, took him for two years. Then from the age of three years to seven years, he was boarded out in Aberdeenshire and then his guardian was changed although still in the same County. These changes created a condition of complete insecurity which was reflected in his behaviour: He was a bed-wetter until fourteen years old, always moody, very shy and suspicious, unable to play with boys of his own age; a bully of younger boys. His mental retardation caused him to be ridiculed at school and he frequently played truant. He became solitary, living in a dream world, avidly reading "Westerns" and adventure stories and attending the cinema as often as possible.

With adolescence his fantasy took a more sinister form. He would sit for hours whittling at a stick and threatening to stab his guardian. He threw a knife at another boy but in fantasy pretended he had stabbed the boy in the stomach, nearly killing him.

After this, he was admitted to Lennox Castle Institution. Here, he became enamoured of a member of the female staff and threatened to stab her and commit suicide. By 1952 he was much improved but was still shy, solitary, a voracious reader and very inhibited.

I included him in the group in an endeavour to give him more attention and affection than is possible with 100 other boys to mother.

Alex—M.A. 8½ years. Actual age—22 years.

He was the youngest son of a family of five with one younger sister. The father was very strict with his children, and Alex was frequently "leathered" for wrong-doing. He attended special school and could write only his name, and read very simple words. When the father died, Alex's elder brother was unable to keep him under control and in his own words, he became "fall-guy" for a local crowd of hooligans. He was admitted for attempted theft. In the Institution he gave little trouble. He was untidy, noisy and inclined to bully but was an excellent worker and easily handled. He was extremely gullible.

Douglas—M.A. 9½ years. Actual age—20 years.

The only son of respectable parents, he had two sisters, one younger, one older. He suffered from meningitis in childhood. His father was advised to send Douglas to Special School but refused to do so. After Douglas left school the family moved to Kenya where Douglas tried several jobs but always became involved in trouble because he associated with undesirables. Later he joined the Army but was discharged for theft. He was sent home to live with his grandparents but again joined a gang of hooligans and stole from his relatives. In the Institution he was a quiet well-mannered boy, a good worker. He was always dominated by some other boy.

Peter—M.A. 9 years. Actual age—21 years.

One of a large family. Attended Special School. Sent to Remand Home for frequent petty theft. A brother was also in a Remand Home.

When discharged aged sixteen years, he worked for one and a half years on a farm until again arrested for petty theft.

In the Institution he proved a good patient, clean, willing and causing no trouble except occasional bouts of stubbornness when he would submit neither to command nor to persuasion, and very rare violent reactions to frustration when he would break a window.

Peter was taken as a reward for good conduct and in an attempt to wean his affections from extremely bad home conditions.

Robert—M.A. 10½ years. Actual age—19 years.

His father suffered shell-shock in the first World War and was liable to "depression and brain storms". He had been in a mental hospital. He would allow no noise in the house and the children were sent into the streets all day. Robert appeared before the Juvenile Court for truancy. When he was thirteen years old his parents separated. Robert, in the care of his mother, sold his brother's bicycle and was sent to an Approved School for two years. There he apparently did very well. He left aged fifteen and a half years but could not hold a job and would not even bother to go out for unemployment money. He was in trouble with the police four times for petty theft, when he was admitted to Lennox Castle Institution at his mother's request.

I regarded Robert as a pre-clinical schizophrenic. He did not mix well with other boys and was a poor worker. He preferred to identify himself with authority, working best with a tradesman whose sole care was Robert. He was terrified of becoming mad like his father and of himself having a home-life like that of his parents. He had a very active fantasy world which frequently changed: once on a walk, he, who loathed the country, built a picture of himself as a contented shepherd, passing the days in solitary toil; at another time he would be a great radio singer; later, a large-scale racketeer, racing in fast cars from the police. Yet another fantasy was that of getting his discharge and working hard to save until he could build a fleet of lorries, marry and so live happily ever after.

In actual fact he did not work to obtain licence. When given singing lessons he took little advantage of them, and on being given farm work, left the job of his own accord. He did however, realize one dream by driving away a lorry—not his own. Normally he was easily dominated by real or assumed authority. He never fought with the other boys but placated them and authority. Like a chameleon, he changed his colour to suit his company.

Rorschach Test showed an anxiety state superimposed upon mental defect.

Charlie—M.A. 10 years. Actual age—17 years.

Youngest son of respectable family of ten children. Charlie's real mother died when he was five years old and he now has a step-mother whom he accepts as his real one. At the age of fourteen years he was sent to an Approved School with four convictions of theft and indecent assault. He was transferred to Lennox Castle Institution after one year because his Mental Deficiency made him a bad influence in the school. In Lennox Castle Institution he was noisy, a bully and liable to uncontrollable outbursts of temper. He had been recently transferred to my ward and though his behaviour was unpredictable and he had at no time had any prolonged period of good behaviour, I personally found him controllable, and the Institution joiner with whom he worked gave him an excellent recommendation. I believed his outbursts were at least partly due to the restrictions of Institution life and wished to see his reactions to a less regulated environment. I anticipated a certain amount of difficulty with him, and got it!

Joe—M.A. 9 years. Actual age—32 years.

Joe's mother was Roman Catholic, his father Protestant. While the father served in the Army, the children were sent to R.C. Schools and on the father's return, severe family quarrels arose so that the children were removed from the parents. Joe was boarded out, and admitted to Lennox Castle Institution aged eighteen years for theft. In Lennox Castle Institution he was good natured, rather lazy, something of a Don Juan. He had been tried on licence twice but each time returned of his own accord to Lennox Castle Institution.

I took Joe as a substitute for another boy who had had to drop out. I hoped his long Institutional training and previous camping experience would enable him to help us.

EQUIPMENT

Each boy was provided with the following equipment, which he had to carry and be responsible for: 1 sleeping bag, 1 billycan, 1 plate, 1 mug, 1 knife-fork-and-spoon set, 1 waterproof cape, 1 waterproof cover, 1 khaki shirt, 1 coloured shirt, 1 pair corduroy shorts, 1 pair flannel trousers, 1 pair khaki shorts, 1 pair sandshoes, 1 pair leather lacing shoes, 2 towels, underpants, vest, 2 handkerchiefs, 2 pairs socks, swimming trunks. None of these bore the Institution stamp. Soap, shaving kit, dishtowels, etc., were communal. Besides his personal possessions, each boy had to carry some food. I wore denim jeans or shorts and carried 1 cotton frock and a wind cheater, first-aid kit and cycle repair outfit as well as cigarettes for myself and the boys. A cotton kit bag, strapped on to the carrier of each bicycle and covered by the waterproof cover, held our belongings and besides these we had a large haversack holding the day's supply of food. One of the boys carried this on his back. From the first we found it more convenient to split the loads, one boy carrying, e.g. 4 loaves and a couple of tins, while somebody else carried two or three billycans. The boys varied greatly in willingness and skill in packing loads. Charlie could be relied on to take less than his fair share, and for the pack to drop off his carrier sometime each day. We found it best to carry all butter, fat and jam in tins, all tea, sugar, meal, etc., in cotton flour bags, tied with tape, stitched on. We also had two sheath knives for whose possession the boys vied. We gained 2 spoons and half a billycan on the journey and lost 1 sleeping bag, 5 handkerchiefs, 3 vests, 2 towels, 1 pair cord shorts, 1 mug, 1 dishtowel, 1 pair swimming trunks.

Because we were not in good training we planned short runs and for the first three days were tired by the end of the journey. After that, the boys would cycle any distance without fatigue.

ITINERARY

Tuesday:	Lennox Castle—Inverbeg Hostel (on Loch Lomond)—34 miles.
Wednesday:	Inverbeg—Crianlarich—29 miles. Five miles on foot.
Thursday:	Crianlarich—Ballachulish Hostel—35 miles through Glencoe.
Friday:	Ballachulish—Fort William (Glen Nevis Hostel)—31 miles.
Saturday:	In Fort William.
Sunday:	Glen Nevis—Loch Lochy—23 miles.
Monday:	Loch Lochy—Alltsaigh (on Loch Ness)—20 miles.
Tuesday:	Alltsaigh—Inverness—24 miles.
Wednesday:	In Inverness.
Thursday:	Inverness—Kingussie—44 miles.
Friday:	Kingussie—Perth—75 miles.
Saturday:	In Perth.
Sunday:	Perth—Lennox Castle Institution—61 miles.

On the first day we were late starting. One of the less favoured boys punctured Alex's tyres at the last moment and these had to be repaired; next delay was for photographs of the start, and then, when we did get away most of the food packets for the first meal fell off our bicycles before we had reached the gates of the Institution. Two miles from home we had to stop for Charlie who said his chain was slipping. His was a good bicycle, completely overhauled before the trip, but Charlie would tinker with it and it repaid his efforts by being a perpetual source of trouble: He had more punctures on the trip than the rest of us put together, we had to have his chain repaired, remove his mudguards and eventually buy a new front wheel when he buckled his own. From first to last he remained covered in an everthickening layer of black grease, not greatly affected by his reluctant ablutions. When we all attended the public baths at Inverness, the hot showers temporarily revealed his natural complexion but not for long.

Four miles from home on the first day, he did not appear round a corner and I had to send two boys back for him. I then realized that if the boys were to enjoy the trip at all, we could not keep them bunched together. Thereafter either Mr. McGill or myself stayed within view of the last of our cavalcade and we took no other precautions.

Often at the beginning of the day we were completely outstripped by the boys but generally caught up with them sooner or later. The emotionally insecure Jock cycled with one of us or alone. Impulsive Charlie dashed off energetically each morning to finish at the tail-end after the first two miles. Robert, in "official" mood for the first five days, rode with one of us, and then with Joe. The others changed speed and companions from time to time though Douglas usually plodded along at his own pace. Alex and Peter loved racing.

In the afternoon of the first day four of them took the wrong turning and disappeared. Knowing that they could all read and that they could join the correct road further on, we continued on our way with assumed nonchalance, to await their appearance at Balloch. Here I realized two things; firstly, that I should have to be careful with money—buying ices, coffee and postcards for the waiting party made a large hole in our daily budget; secondly, that if I were to complete the journey, much less enjoy it, I would have to stop worrying. After a few more days, the necessary philosophical outlook, became real not assumed. Preparing breakfast, feeding us all, cutting sandwiches, packing everything, directing the boys and seeing them off, then getting Donnie and Mrs. McGill off, these became the essentials of each morning; collecting, cooking and eating supper, the essentials of each evening. Accidents, runaways, thefts or other unpleasant incidents would have to be tackled if and when they arose. At the time I felt completely fatalistic about it and did not realize until after the trip how much nervous strain it entailed.

Eventually, our four wanderers arrived safely and we proceeded on our way, only stopping to buy more postcards, and to sit in the sunshine. Postcards were an obsession with the boys who sent them from every stopping-place. Being photographed was another of their joys and they could not realize that our funds would not run to unlimited camera spools. They also revelled in the freedom. At one point they climbed a high wall beside the road from sheer exuberance—perhaps it was fun to climb in instead of out!

In our first hostel that evening they behaved very well. They did not mix with the other hostellers. Paul and three of the boys did play nap with a stranger but I think this was the only occasion of the whole trip. Charlie, Peter, Alex and Douglas braved the midges and icy water to swim in a good pool beside the hostel. In doing so, they managed to make the acquaintance of an intrepid German girl who dived and swam until she was blue. Language barriers, if no others, prevented ripening of the acquaintanceship, but the boys were thrilled.

On the second day after another late start—we only once managed to leave a hostel early—Alex left the haversack in a shop. While returning for it he picked up the first of his pets, a chaffinch that had been hit by a car. He brought it back and refused to leave until it had recovered sufficiently to fly away.

Jock helped to make a fire while we waited for Alex and in doing so got a slight cut on his hand. Any of the other boys would have ignored it, but, since it was Jock, I disinfected and bandaged it. Five minutes later I turned to find him in a semi-fainting condition and much petting was required before he recovered.

Later, we stopped to look at a veritable devil's cauldron in the River Falloch. The boys were all eagerness to swim, not realizing the danger. The last part of the journey was a stiff climb and most of us walked but Peter, Alex and Douglas caught the backs of passing lorries and were pulled along, again regardless of consequences.

That evening, Alex mounted a horse in a field and was immediately thrown. Nothing daunted by its thundering hoofs he spent the next half-hour trying to remount. After supper there was a sing-song in the hostel, of which more anon.

The next day's journey from Crianlarich to Glencoe was fairly uneventful. The boys raced off, and since the first part of the road was dangerous, I kept up with them. Jock cycled beside me to tell me how ill he felt, but I was myself feeling rather stiff and the pace was too hot for me to spare any sympathy. So poor Jock had to recover without it, and did so. We had the usual bicycle trouble with Charlie and at one point I found him standing beside an empty car. Suspecting his intentions, I chased him off only to discover him later asleep at the side of the road. In the morning, Robert asked permission to make a twenty-five mile detour to visit his mother, promising to rejoin us in the evening, but I refused permission. Later he and Mr. McGill were outdistanced by the rest of us and when neither appeared for some time, I began to wonder if Robert had decided to take the law into his own hands and gone off. Fortunately they had only been delayed by a puncture. We had long rest periods that day, lounging in the heather and did not reach the hostel until late evening. There was only time for a huge supper and a stroll before bedtime. Robert went off alone with Donnie.

For these first three days, the boys were slightly subdued, careful to comply with regulations and remaining very much as a group. This was as long as Institutional influence was noticeable. During that time they were continually coming to the McGills or myself for companionship, conversation or merely a light for a cigarette. I began to regard my cigarette lighter as a symbol of reassurance. I gave each boy ten Woodbines per day, five in the morning and five in the evening. When we started, each had five shillings pocket money and could have bought matches although these are not allowed in the Institution. One or two of them had lighters of their own. But they preferred to light their cigarettes with my lighter or, if the McGills or I were smoking, from the lighted end of our cigarettes (not each other's). This was particularly noticeable during the first three days, after which the boys became more independent. But to the end of the trip Jock preferred lighting his cigarette from one of ours.

For the next three days, Institutional training was shed like a cloak, and each boy's disinhibited reactions were a source of interest and aggravation:

Jock dissociated himself from the group since he could not compete with the robust aggression which became manifest in most of the others. He demanded constant attention, generally achieving it in a most irritating manner. His favourite method was to approach Mrs. McGill or myself silently, give his victim an unexpected prod in the ribs or arm and ask for a light. Repeated frequently this was, from his point of view, a very satisfactory method of ensuring our constant awareness of his presence. Another means of getting attention was his habit of never helping with the chores until scolded into doing so. Having reluctantly set about his task, he would further infuriate us by asking where to find this, where to put that and so on. This was not due to laziness, as shown by his feat at Kingussie. There I set him to cut wood for the Warden and he sawed logs steadily for two hours.

Alex became much noisier, assertive and occasionally almost agressive. He developed a habit of being helpful by gripping my arm painfully and pushing me away so that he could take over whatever task I had. He found it impossible to appear tidy. He and Douglas had a violent quarrel about cigarettes.

Douglas, normally dominated by Alex, became resentful of him. He grew lazy and also noisy.

Peter became more assertive. He was once sullen but was cheerful for the rest of the time, his release from tension taking the form of pride in his own accomplishments. If this was a disinhibited Peter, he was a very acceptable person.

Robert, who had identified himself with authority for the first three days, was unable to maintain that standard. Nor could he join in the disinhibited behaviour of the other boys. He swithered between the two camps or went off by himself. After Alltsaigh, he followed Joe's lead and deteriorated.

Charlie, noisy and lazy from the start, became aggressively so. At Glen Nevis hostel I caught him swearing loudly in the kitchen because I had insisted he do his share of washing-up. He was so truculent that I thought I should have to send him home but the threat subdued him somewhat. He had fallen off his bicycle the previous day on the straight, flat traffic-less approach to Fort William. For the next two days, only the threat of being sent home kept him under control. Then, on Monday, he cycled into a deep rut at the side of the road, buckling his front wheel. After this he became much more cheerful and friendly, and I then wondered if epilepsy was the cause of his falls and his temperament.

Joe became the slovenly, and I suspect bawdy, buffoon. After fourteen years in the Institution, his training took longer to evaporate but, whereas the others improved later, Joe steadily deteriorated. Until Alltsaigh, he cycled with Paul but thereafter had no time for him.

I believe that the emergence of the worst side of my boys was accelerated by the Glen Nevis Warden. Admittedly, when we lunched that day, they all rushed off to Fort William, our first town of the journey, with every sign of independence. On the other hand, the Glen Nevis Warden was the only one we met who found it necessary to be absolutely rigid in the application of the rules. I considered him officious and bad-mannered. This may have adversely affected the boys. It certainly annoyed me. A watch disappeared in this hostel, and the Warden accused my boys as well as the other men. There was a tension in the boys but I accepted their word that they had not stolen the watch. In Inverness we heard that it had been left on a handbasin and had been taken into safe custody by another hosteller who returned it to the owner.

We had planned to spend the week-end in Fort William, staying in this hostel. On Friday night the boys insisted on a visit to the cinema. On Saturday, to restore my crumbling morale, I went to a good hotel for a hot bath and a decent meal. I told the McGills to let the boys fend for themselves, but the latter, after the first half hour, hung around so disconsolately, that Mr. McGill felt obliged to take pity on them and spent the day buying them postcards, ices, etc., and showing them the things of interest in the town.

At three o'clock we all returned to the hostel and it was then that the trouble with Charlie arose.

Next day, we set off for Loch Lochy. The boys raced ahead but we soon overtook Robert whose three-speed gear had broken. Sunday morning is not the time to have a breakdown in the West Highlands. No garages were open, and it was a long time before a friendly motor-cyclist managed to repair the damage.

When we reached Loch Lochy, we found the hostel Warden rather perturbed and Mrs. McGill verging on hysterics. The boys had stormed into the hostel, whistling, singing and shouting, cutting bread and leaving crumbs everywhere, completely out of control. We at once set them to clear up the mess they had made which they did with such success that the Warden complimented them on their efforts. They were so delighted by her praises that next morning they scrubbed and polished the whole hostel without being asked. The Warden invited us to return—she was a delightful person.

On the following day, Charlie had his second fall and three of us waited with him until a friendly lorry gave him a lift to Fort Augustus. He had been so troublesome that I would not let him wait there for the necessary new front wheel. I gave him my bicycle because it had no bar and was a strong model. I took Alex's and left Alex to await the repair of Charlie's. Alex's was a fixed wheel, racing bicycle with downbent handlebars and a knife-edge seat. I shall never forget the agony of riding those ten miles to Alltsaigh. However, the evening in the hostel was the most enjoyable of the whole trip. The Warden's husband told wonderful stories of the Loch Ness Monster which the boys lapped up and later they joined up with several young folk in the hostel, due, strangely enough, to Jock.

Since our first evening, we had all been on the look-out for feminine society for the boys. We had no luck until another German girl arrived at Glen Nevis. She was a student, I think, rather solid, plain with hair coiled in enormous earphones—not the boys' usual idea of beauty. But they had seen her the previous day and were, therefore, less afraid than usual. They at once began to pay her homage, making a space for her pan on the stove and other small attentions. Joe, Robert and Charlie spent a large part of the evening in communal courtship. A red-haired girl from Glasgow joined their group. At Loch Lochy, they became enamoured of two "smashing" French students, really attractive girls, and I was allotted the task of translating as best I could, their fulsome compliments. The girls took it in very good part. Jock had taken no part in these friendly encounters. He was too shy to do anything more than stand about, generally in somebody's way, hoping for attention. When this failed he would retire to a corner with a book and be very hard to rouse into activity. "Ah dinna feel like it" was his most frequent remark. At Alltsaigh, however, his great moment came. Staying in the hostel were two Aberdeenshire school girls, real tomboys. The familiar accent must have emboldened Jock, or perhaps they recognized his; I do not know who made the first overtures, but while preparing tea I was pleased to find Jock in conversation with one of the lasses. This developed into a friendly sparring match. After tea, all the boys joined forces with the two girls and some other young folk in the hostel, and had a cheery sing-song. At supper time however, I discovered Jock sitting miserably alone, refusing to eat. His explanation was that the lass had hurt him with a blow in the stomach. Poor lad, he could hardly give the real reason for his misery—the other boys had stolen his girl-friend. Apparently he cried all that night and spoke of suicide. Still very woebegone next morning, he would eat no breakfast until I fed him from a spoon with milk and jelly. That and a bracing talk revived him sufficiently to continue the trip, but he became more withdrawn than ever. He would hang about in the hostels saying nothing, but watching some girl, and he drove Mrs. McGill and myself nearly to distraction (or his destruction) by his constant demands for attention.

On the road to Inverness we were given a most striking example of the difference between the normal boy and the defective. Because we were to reach a town that day, the boys raced off early leaving Paul to cycle with Mr. McGill and myself. When we stopped for a cigarette, Paul immediately disappeared and we heard him playing at the loch-side. None of my boys would have done that. Alex, with the lowest I.Q. was more able than the others to find his own amusements, but even he was very dependent upon "laid-on" entertainment.

By the time we reached Inverness the boys had settled down after their previous four days' over-reaction to freedom, and were more or less adapting to the new environment. Peter and Alex could always be relied on for the essential chores such as buying milk, bread, etc. They were the only two who would start cleaning up after a meal without being asked. Douglas remained lazy and more assertive than formerly. Charlie, cheerful now, became very fond of Donnie but was dirty, unreliable and noisy. Robert had to be chivvied into doing the ordinary chores but would volunteer for any unusual task. For companionship he alternated between Joe and ourselves and his behaviour varied accordingly. Joe remained lazy and slovenly in his appearance. In the Institution he is regarded as one of the Lotharios, and during the trip he was the most interested in girls. At Inverness he made friendly advances to a girl in the hostel but she ignored him, and at the Open Air dancing in the evening, he had difficulty in getting partners, girls obviously thinking him the simpleton. This was possibly due to his speech defect—he suffers from nasality and a burr. Also by this time he had deteriorated in personal tidiness. To compensate for the rebuffs he became even more the buffoon. Jock had set his pattern of helpless dependence. He disgraced himself by attempting to smoke in Inverness Cathedral and in the Baths.

The other boys revelled in the baths. They were only slightly interested in the salmon netting of the river, but surprised me by their real interest in the Museum, where we spent two hours examining the weapons, birds and animals. They were fascinated by a reproduction of an 18th century cottage complete with old woman and sheepdog. I felt that they half-expected the models to come to life at any moment. The day we spent in Inverness was wet and by four o'clock I no longer knew how to keep them entertained. I did not want them to stand about the streets or go to a billiard saloon. They themselves solved my problem by asking to go to the cinema again, having been there the previous evening. Jock in character, went to a different picture house from the others. By evening the weather had cleared and they came to the Open Air dancing but only Robert, Joe, Charlie and Alex danced.

The run from Inverness to Kingussie was forty-four miles, the weather atrocious with heavy rain and a head wind. That day Charlie met his "china" travelling north by car. The friend invited Charlie to accompany him, but, to my gratified surprise when I heard about it, Charlie refused to go.

The following day the boys cycled seventy-five miles to Perth, apparently without effort. They even raced the last twelve miles. I cadged a lift. Alex arrived at the hostel with nine fledgling partridges in his shirt. He had found them in a field and brought them with him. He was quite happy to set them loose near the hostel.

Throughout the trip I had hoped that the boys would learn to mix with the other hostellers. Apart from Alltsaigh this had not been the case. At Crianlarich there was a general sing-song. The usual hostellers sang rhythmic tramping songs such as "The Road to the Isles", while my boys, totally unfamiliar with Celtic Culture, knew only the slushy sentiment of the radio crooner and were surprised that their contributions, sung in doleful harmony, did not impress the other hostellers. There was no mixing there. At Inverness and Perth hostels were working lads of their own age, but my boys could not find common ground with them either. In Perth we went to a dance-hall. It was packed with the "toughest" crowd I have ever seen—hydro-electric workers and their "dames". The women ranged from the ordinary in cotton dress with bare legs, to the ultra-smart in tight slit skirt with sloppy-joe revealing plenty of uplift, and sheer nylons. Here at last, I thought, my boys could find their own level. But no, they preferred a small hall in the same building where the local less-sophisticated people were doing old-time dancing. Here Robert had some success. An English girl in the hostel joined our party to go to the dance. Robert sat with her most of the evening, talking Grand Opera of which he knew nothing. Being a handsome, persuasive lad he got her permission to take her home to the hostel after the dance, but he bungled it and they both came back with us amid the winks and comments of the others. He did, however, take her to look at the bicycles for a few minutes.

Our last day's journey was from Perth to Lennox Castle Institution. Jock, carrying the food haversack, decided he must be back in time for church. The rest of us were left hungry. At Dunblane we scraped enough food together for a meal and then discovered that the camera had been left in a field twelve miles further back. Charlie and Robert volunteered to hitch-hike (for speed) back for it. With some trepidation I consented. Alex, Douglas and I waited for them, sleeping in the sun. While the others rode homewards. By five o'clock we were hungry again, and Robert and Charlie had not returned. We managed to buy some bread and ice-cream in a cafe and I set off to look for the missing pair. After cycling five miles, I found them walking towards Dunblane. The Sunday afternoon traffic was not friendly and they had walked seven miles. I gave Charlie my bicycle, tied a bandage round my ankle, looked doleful and hobbled with Robert until a friendly lorry picked us up. We reached Dunblane at eight o'clock, too late for the journey home without lights. I had just sufficient money to pay for a night in the hostel and some eatables and condensed milk. So we stayed that night in Dunblane hostel.

That evening and next day the boys were really helpful. They behaved better than at any other time on the trip. Charlie, of course, had two punctures as a final gesture, but the other boys mended them for him. I felt then that I could have managed the whole journey without trained nurses.

At the beginning of this article I stated the threefold object of the tour, viz.:

(1) To study the reactions of Defectives to a normal environment.
(2) To widen their horizons.
(3) To provide an antidote to Institutionalization.

My conclusions will be grouped under these headings:

(1) It is difficult for the high-grade feebleminded youth to adjust to a normal environment. His group is not recognized socially; appearing normal, he misses the sympathy given by ordinary members of the community to the more obviously afflicted. A slow worker and thinker, unable to plan ahead or to do complicated arithmetic, he is expected to compete in a world where speed and money are of prime importance. He tends to over-compensate for his inferiority by misbehaviour or buffoonery. In cities he finds his natural taste for extraneous entertainment all too easily supplied in dance halls, cinemas, billiard saloons, etc.—at a price. There too, he finds associates in the sub-cultural groups and in criminal gangs for whom he often becomes the catspaw. To lead a happy and useful life, he requires training in work suited to his ability, companionship with those of his own mental level and kindly supervision. The tour showed my boys at a disadvantage but they did not steal or in any other way overstep the social bounds. When given a job within their capacity, they did it willingly and well. It is possible that a Club for this type might prevent much petty crime. Certainly After-Care Committees can make an enormous contribution in helping boys who leave Institutions.

(2) It is difficult to assess how much their horizons were widened by this tour. Not much, I fear. Although they ask when it is to be repeated, they do not talk much about it. The physical effort on the road brought more joy than the impressive highland scenery. The defective would appear to give little thought to the past and even less to the future. He lives for the moment. This would explain his inability to benefit from experience and his lack of planning.

(3) I am beginning to feel that for the high-grade feebleminded person, the modern Institution is too elaborate. We train the patients to bodily cleanliness where there is abundant hot water, bath tubs and sprays in centrally-heated buildings, but on his return home he has to adapt himself to the cold tap and the never-empty sink. In the Institution amusements and sports are all "laid on". Does he get enough training in self-entertainment? And now Television! On leaving the Institution, he misses these entertainments and the crowd. To find them, he is apt to revert to his old companions and pursuits.

ACKNOWLEDGMENTS

I should like to express my gratitude to and admiration for the Scottish Youth Hostels Association. It provides a wonderful chance for people of all ages and types to see the country and mix with their fellow citizens very cheaply and, if not in luxury at least in cleanliness and some comfort. With one exception already mentioned, I found the Wardens most helpful at all times.

I also have to thank Dr. J. T. Curran, Physician Superintendent of Lennox Castle Institution for instigating the project and reading the proofs of this paper.

THREE CASES OF PSYCHOSIS AMONG THE ESKIMOS

By

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THE study of actual instances of psychosis among non-literate peoples can enhance our understanding of the relationship between mental illness and the society in which it occurs. Analysis of case histories may enable us to see how social, biological and psychological factors reciprocally influence each other to produce mental disease. Some light may be thrown on the question whether or not there is a common nucleus of aberration which is universally manifested.

The material offered here concerns three Eskimo cases of psychosis. Data were gathered during a field trip to the Arctic in the winter of 1951-52 and subsequent visits to the mental hospitals in Manitoba to which the patients were removed.*

The Eskimo community in which these illnesses occurred is located on Southampton Island, the largest island in Hudson Bay, lying at its northern boundary. Approximately 18,000 square miles in area, the Island has an Eskimo population which ranged from 132 in 1930 to 236 in 1951.

For our purposes, the question of Eskimo disease theory is of particular interest. In earlier times, the Eskimos on the Island used magic to augment their prowess and to protect themselves from disease and other harm. An impressive number of amulets, rites and spells existed for these purposes. Following white contact with its resulting social upheaval, magic was gradually replaced by witchcraft in which the psychic powers of the witch were used to bring misfortune to an enemy, thus rendering obsolete the magician's tools. Along with witchcraft developed its inevitable accompaniment, witch-fear, which rests upon the belief that someone is using witchcraft against one. These phenomena—witchcraft and witch-fear—developed as the people experienced anxiety in the face of widespread social changes (Carpenter, 1953). Their anxiety was expressed in the form of intra-group hostility and all misfortune, such as disease, was attributed to the ill will of a human agent. The socially destructive nature of Eskimo witchcraft produced a climate of suspicion, fear and hostility. However, at the same time, it offered a consistent theory of disease and mental disorder, not to be taken lightly in the absence of scientific medicine. While disease generally was attributed to the psychic influence of an enemy, in some instances,

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other etiological factors were believed to be at work. These included malevolent ghosts, offended deities, taboo-violation and intrusion into the body of a disease-producing force or object. Newer knowledge of bacterial agents had been incorporated into the Eskimo system of belief in a consistent manner: that is, the Eskimo understands that bacteria cause disease, but one person becomes ill and another remains well because someone is influencing the ill person, making him a prey to the bacteria. The mortality rate is very high; 60 per cent. of the deaths occur before the age of 20, as compared with the Canadian average of 19 per cent. Tuberculosis, influenza, pneumonia and accidents are the chief causes of death. Epidemics of diphtheria, typhoid fever and poliomyelitis have also taken a heavy toll. It is generally accepted that many of these diseases which are now widespread were brought into the Arctic through white contact.

The first white contact of any consequence occurred at the beginning of this century when New England whalers came to the Island. The Hudson's Bay Company store was established in 1924 and the Catholic mission was built a year later. Scientific missions occasionally visited the Island. However, it was not until World War II and thereafter that any appreciable white contact took place. The influence of this more recent contact is seen in the shift from a semi-nomadic existence to the comparatively sedentary way of life now followed by many of the Eskimos. The rapid social changes accompanying white contact have been reflected in different ways, such as curtailment of the practices of wife exchange and female infanticide.

It was during the decade of the 1940s that the three patients with whom we are concerned came to Southampton Island and were later removed because of their illness. This was a time of considerable social turmoil on the Island. The reshuffling of population which had been begun by the whalers when they settled 70 Eskimos on the Island in 1908 continued under government auspices. Today, the Island has four Eskimo groups which, though they share much in common, are separated by dialect and heritage. Population movements represent attempts to deal with imbalances in the ratio of females to males as well as to deal with game shortages in certain areas. These efforts to cope with existing problems created new problems on Southampton Island. As more people moved to the Island, the balance of its economy was upset. The game supply was decreased; the uncertainty of the fox trade continued. Inter-group hostilities and suspicions among the four tribes on the Island were rife. The older inhabitants looked down on the newcomers who had frequently been selected for emigration by the traders at their places of origin as being among the least desirable members of the group there. Assimilation was a slow and problem-laden process. Anxiety in general was heightened as old values, traditions and beliefs were questioned and modified. In this stressful social situation, witchcraft developed and the three cases of psychosis occurred.

Case No. 1—Arnaitiang*

This patient was born about October, 1919 at Port Burwell, on the northeast coast of Ungava Bay. She came to Southampton Island in about 1940 and remained there until she was removed to the Hospital for Mental Diseases, Selkirk, Manitoba in July, 1948.

Family

Arnaitiang's mother, Manetoo, was living and well at the time of my visit and was my principal informant. While the family was still living at Port Burwell, the patient's father had been killed in an accident when his sled overturned. At the time, he was on his way to fetch Manetoo's sister so that she might stay with Manetoo while he went off to his trap-line. Manetoo was extremely fearful of being left alone and it was later felt that the patient's father had died as a consequence of his wife's need for special attention. This apparently strong need on the part of Manetoo was regarded as somewhat peculiar and it is certainly out of keeping with the usual pattern of Eskimo husband-wife relationship.

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* All names used are fictitious; otherwise, the facts as reported are faithfully adhered to.

Arnaitiang was the eldest of four children. One sister, Mitiq, now dead, always became "queer" at the time of the full moon. She was quick-tempered and often beyond control, especially at the time of the full moon when the Eskimos believe that anything negative is accentuated. The second sister, Itu, died of meningitis shortly after the family came to Southampton Island. The only living sibling, Manik, is married and has one child. He lives with his mother and helps to support her. However, he is not a very capable hunter, and he is subject to irritable outbursts. He quarrels a good deal with his mother and was reported to have beaten her because he feels that she was responsible for his father's death. From the time the family first settled on Southampton Island, they were all regarded by the other people as somewhat unstable and unreliable.

Development of Illness

Although Arnaitiang shared the family's poor reputation and, in addition, was considered to be over-sexed, it was not until about 1946, six years after she arrived and about two years before she was finally removed, that her symptoms became particularly marked. On a long trip which she made, she constantly accused other members of the party of talking about her and, without seeming provocation, she would throw things like rocks and pieces of ice at them. She had to be returned to the post because of her behaviour and on her return, she continued to be irritable and to treat the children roughly. At one time, when the wind blew her parka away, she was in a rage for three days, blaming everyone for stealing it. Her behaviour was such a disturbing influence that she was ordered out of the camp in which she was living.

The concern of the Eskimos with her peculiarities was so great that when two doctors visited the Island in the summer of 1946, they were asked to examine Arnaitiang. The doctors concurred in feeling that she would have to be admitted to a mental hospital. In January, 1947, Arnaitiang was again examined by two visiting doctors, one of whom was a psychiatrist. At this time, a diagnosis of hebephrenic schizophrenia was made.

Shortly after these examinations, Arnaitiang had an experience which seemed to intensify her symptoms. At this time, she was about 28 years old and still unmarried. According to custom, she had been sleeping with several different men and she finally developed a particularly close attachment to a man named Maleki who was six or seven years her junior. He had recently moved to Southampton Island with his family. Maleki's mother objected to any permanent liaison since she did not want her son to marry someone older than he. Arnaitiang's mother, Manetoo, who had made no objections up to this time, now told Arnaitiang to stay away from Maleki. The combined efforts of her mother and prospective mother-in-law to thwart the marriage enraged and irritated Arnaitiang. One night she got up from her bed, where she was lying with Maleki, and went to another tent for matches, despite the fact that there were matches in her own tent. The tent to which she went was the one in which Maleki's mother lived and it was later guessed that Arnaitiang had intended to attack her, although no incident actually took place. Soon after this, Arnaitiang began to accuse more people of talking about her; she would accost them and censure them. She claimed she could hear these people talking about her, and she would record what they were saying on slips of paper, but would then destroy the paper before anyone could see it. She developed a peculiarly violent hatred for the Hudson's Bay Company people.

Other symptoms included walking about aimlessly, rubbing her leg, and continually singing hymns. She would talk to no one in particular but was always mumbling. Often in her meanderings, she stopped to fondle children and she kept repeating, "I have two children". She was also overheard to say that she had a husband and she frequently uttered a sound "peeai" which is a neologism, having no meaning in Eskimo.

Shortly after this behaviour began, she was "observed" by a boy to be having intercourse with "something unreal" covered by hair. The boy almost fainted, since the "thing" was considered to be the dog-husband of Nuliajoq, a Cerberus-like creature in Eskimo mythology, who is also an incubus or demon-lover.

In the year preceding her evacuation, Arnaitiang made two predictions about people dying and in both instances she was correct. She was generally regarded with fear, especially by the other women, who, contrary to custom, barred their doors when they heard her coming.

Native Treatment and Explanation of Illness

An effort was made to treat Arnaitiang through confession. She confessed masturbation, which was considered an insufficient explanation for her symptoms. She was tied down to elicit further confessions but nothing else was forthcoming. Since the family had been converted to Christianity some time ago and was familiar with the chastity code, Arnaitiang's mother, knowing of her daughter's promiscuity, felt this might be her only other sin. Actually, neither chastity nor Christianity were taken too seriously so that this too would have been regarded as an insufficient explanation for Arnaitiang's illness. The explanation which was generally adhered to had to do with the mother's responsibility for the death of her husband. It was felt that punishment for this wrong was being inflicted on Arnaitiang, who had inherited the sin from her mother.

In April, 1948, after a particularly violent episode during which Arnaitiang wrecked the interior of her mother's shack, steps were initiated by the Hudson's Bay Company manager to arrange her removal. By this time, it was felt that her condition had reached the point where she endangered the lives of others. Because of the difficulties of arranging transportation, it was not until the last day of July, 1948 that Arnaitiang finally reached the mental hospital. Just prior to leaving Southampton Island, she asked her sister, then pregnant, to name the new baby after her, thus following the Eskimo custom of naming an infant after a reincarnated ancestor. Apparently, Arnaitiang felt that her spirit-name had permanently deserted her body.

Arnaitiang is described as having been "achitongayaktook", which is roughly equivalent to "soft in the head"; also, she was called "pislangesaktook" which can best be translated as "mad".

Course in Hospital

Arnaitiang was admitted to the Hospital for Mental Diseases, Selkirk, Manitoba, after having been examined and certified by a doctor in Winnipeg, Manitoba. This doctor referred to her continuous waving of both hands which appeared to be an effort to ward some person or thing from her. During the first ten days in hospital, these gesticulations continued. The patient was overactive, noisy and displayed a considerable amount of stereotyped behaviour. This consisted of a peculiar type of waving of the arms, accompanied by a rhythmic turning of her head from side to side. No verbal communication was possible because of language difficulties. She appeared to be hallucinating as she frequently mumbled to herself and often laughed quite inappropriately. She attempted to bite the doctor who conducted a physical examination. This examination showed a faint mitral systolic cardiac murmur.

At the end of ten days, she began to quieten down and became more co-operative. She soon became a favourite on the ward, and during the following month, her mannerisms, grimacings and gesticulations ceased. She learned some English words and also learned to knit in a very efficient manner. The nurses took her out to buy candy and ice cream and this made her very happy.

After Arnaitiang had been in the hospital about six weeks, insulin coma treatment was instituted. She showed a marked reaction to this treatment, becoming confused, sleepy and drowsy. At a staff conference, she was diagnosed as schizophrenia, catatonic type. Insulin was continued until a course of 36 treatments had been completed. By November, 1948, four months after her admission, all her symptoms had returned. These included facial grimacing, arm-waving and noisiness. She became unclean in her habits and had a number of emotional outbursts. Electro-convulsive therapy was considered but this was ruled out because of the cardiac pathology.

In April, 1949, a chest X-ray showed an area of infiltration, representing a probable tuberculous lesion. The patient was transferred to an isolation ward where she was overactive and confused. She would sit up in her bed, swaying back and forth and making signs with her arms. She constantly hallucinated and gesticulated. When a doctor entered her room, she would leap out of bed and huddle in a corner until he left. X-rays taken during 1950 and 1951 showed marked increases in the size of the lesion. By July, 1951, there was considerable collapse of the right upper lobe with far advanced, extending tuberculosis. Her physical condition deteriorated with extreme rapidity and her resistance to infection was minimal. She developed bilateral acute pneumonia and died in September, 1951. Post-mortem examination of the chest organs showed extensive fibrous areas throughout both lungs with several cavities in both upper fields. The diagnosis made was fibro-caseous tuberculosis.

CASE NO. 2—PIALIK

This patient was born about 1910 near Wakeham Bay on Hudson Strait. She came to Southampton Island in 1941 and remained there until she was sent to the Hospital for Mental Diseases, Brandon, Manitoba, in May, 1945.

Family

Little is known of Pialik's parents since both died before she moved to Southampton Island. Her father is reported to have been a good hunter, and she is said to have known no special hardships as a youngster.

Pialik was the second of four children, having one older sister, one younger sister, and one younger brother. Her younger sister, Ititayjang, was the only member of the family, besides Pialik, to migrate to Southampton Island. Ititayjang was a very beautiful woman, known for her lack of conceit, her docility, and her graciousness. She died of tuberculosis in about 1946. Nothing is known of the other siblings.

Development of Illness

Pialik was married while still in her teens but, partly because of poor eyesight and the resulting inability to work satisfactorily, she was not an acceptable wife, with the result that her husband left her in a short time. They had no children. She then lived successively with three different white traders for periods varying from one to two years. Each of these in turn deserted her when he left the Arctic, despite promises to take her south. About 1940, having nowhere to go, Pialik moved into the home of her sister, Itityjang and her husband, Tooga. (Tooga, patient's brother-in-law, was my chief informant.) Itityjang hoped that Pialik might be of some assistance in the house. However, in the months following Pialik's moving into the house of Itityjang and Tooga, the behaviour peculiarities which began when the last white man left her now became aggravated. Contrary to her sister's expectation, Pialik did not work and was always the last to rise, often not before noon. After getting up, her chief pre-occupation was eating. She never bothered to repair her own clothes or to care properly for herself. However, since she was in no one's way, she was tolerated.

In the summer of 1941, because of food shortages in the area, Tooga and his family were moved to Southampton Island. As a member of the household, his sister-in-law, Pialik, accompanied them. As she came off the boat, she was seen suddenly to stop and smile. She appeared to be listening to an illusory voice. She repeated this behaviour several times during her first day on Southampton Island and a number of times thereafter so that she was immediately considered queer. This impression was furthered when she was seen to use her hand as a mirror, imaging herself and then smiling.

During the next four years, her behaviour grew steadily worse. She would laugh and smile impulsively with no seeming provocation. She was irritable and would suddenly attack her sister and her sister's children for no apparent reason. She had to be forcibly restrained from using the stick or the axe which she had seized. This danger to her sister and sister's children was so great that, once, when her brother-in-law, Tooga, was away at his traps, the police had to move the family into a house where she could be closely observed. Here, Pialik acted so badly that the police were obliged to move her out into a separate house. She was kept in such separate houses, one a barred igloo built by the Eskimos, until evacuated. It was during this time of living under close observation that Pialik made a particularly violent attack on her sister and had to be tied down in order to be restrained. She claimed at the time that her brother-in-law and one other man who had assisted him in restraining her, had earlier been talking about killing her.

Pialik explained to the police that she had attempted to kill her nieces and nephews because she could see in the minds of her sister and brother-in-law their intention of doing away with the children. She felt she was better able to accomplish this.

Arrangements were made for her removal and she was sent to the Hospital for Mental Diseases, Brandon, Manitoba, in May, 1945.

Native Explanation of Illness

After her desertions by the white men, especially the last one whom she loved, Pialik's longing was intense. She was very upset and could not reconcile herself particularly to the last desertion. This activated a "bad spirit" who appeared in her dreams and tempted her to marry him. This "bad spirit" kept clawing at her heart and she finally gave in. From this point on, the "bad spirit" stayed with her as a guardian, never entering her, but always about her, insuring the continuation of her queer behaviour.

Her illness is described as "pislatchiangitook", which denotes a person who is not in his or her right mind. She was also described as "isomakatchiangitook" which also means not in her right mind, and, finally as "kowyemylingataytook" which can be translated as "at times she does not know what she is doing".

Course in Hospital

On admission, Pialik was quiet and co-operative. She was completely self-absorbed and preoccupied, apparently living wholly in a world of her own. She giggled and laughed frequently and she appeared to be hallucinating. Shortly after her admission, her diagnosis was schizophrenia, catatonic type. During the ensuing year, she was in a semi-stuporous, passively co-operative state. Then, suddenly, late in 1946, she became disturbed and attacked two patients and a nurse. During all of 1947, these violent outbursts recurred on a number of separate occasions. During 1948, she was described as mischievous, restless, irritable, resistive and violent. She attacked and bit a patient. For the first three months of 1949, her behaviour continued to be impulsive and she was confined in a single room. Her hyperactivity resulted in a fractured toe.

By April, 1949, Pialik had been in hospital almost four years during which time she presented an exceedingly difficult problem in patient management, aggravated by the language handicap. In the hope that the nursing problem would be eased, a bilateral lobotomy was performed. For a short time following the operation, there was a slight improvement in Pialik's mental status. However, within about six months, she was as irritable and as violent as before. During all of 1950 and 1951, she continued to be restless, noisy, resistive, combative, and occasionally violent and destructive. She began to hoard whatever she could find—plates, spoons, blankets, etc. At times, she was found to be wearing three dresses. Along with the hoarding which followed her lobotomy, Pialik began to gain weight and in two years, she went from 120 pounds to 175 pounds.

In August, 1952, I visited the hospital and saw the patient. At that time she had been receiving electro-convulsive therapy for about three months. This treatment seemed to quiet her somewhat so that she did not have to be kept constantly in a single room. On the day of my visit, she was fairly co-operative and she showed some slight reaction of querulousness to my mention of familiar Eskimo names. This reaction was shown by facial movements rather than by speech. No words were elicited, either in Eskimo or in English. Pialik's condition is considered unchanged after seven years in hospital.

CASE NO. 3—TOOKTOOK

This patient was born in 1922 in Baffin Land and lived there until about 1939 when she came to Southampton Island. She remained there until she was removed to the Hospital for Mental Diseases, Brandon, Manitoba in April, 1944.

Family

Paternal grandfather, Jar, came to Baffin Land from Labrador and died there before the family moved to Southampton Island. He spoke a dialect somewhat different from the Baffinlanders and it was noted that he always kept his camp isolated from others. He was also known for his left-handedness, an uncommon feature among the Eskimos. Nothing is known about the paternal grandmother except that she was a good worker. The patient's mother died in Baffin Land before the family came to Southampton Island. Nothing is known of her or of her parents. The patient's father, who is still living, is known as a man subject to temper outbursts. The beatings he administered to his children were so unusual in Eskimo parent-child relationships that there had been talk among the Eskimos of turning him over to the Mounted Police because of his behaviour. He maltreated the patient who feared him greatly and he did not permit his daughters to associate with young men. This, too, is most unusual for an Eskimo and, as a result, rumours spread that he was having incestuous relations with his daughters. He remarried after coming to Southampton Island and had two daughters by his second wife, both of whom seemed quite normal. A maternal cousin, son of mother's sister, accompanied the family when they came to Southampton Island. This cousin had a reputation as a trouble-maker, gossiping a good deal. He also had a peculiar hatred for the successful hunters and he claimed the power to take off into the air. After two years, he was returned to Baffin Land at the request of the Southampton Islanders.

Development of Illness

At about the age of 14, while still living in Baffin Land, Tooktook was married but the marriage was not successful and she returned to her father.

One day in April, 1941, while her father was away at his traps, Tooktook was drying fox skins for him. She placed some of the skins outside and immediately the dogs proceeded to tear one up before she could save it. Rather than face her father's rage, she replaced the skin by stealing one from a neighbour, Analic, who, though he noticed his loss, said nothing.

The incident passed without mention, and shortly thereafter, Tooktook married a man who was thirty years her senior. (He was one of my principal informants.) She made a good wife, serving her husband well in sewing, making boots and cooking. Two years passed with nothing unusual happening. In December, 1943, Tooktook gave birth to their first child. At the time the child was born, the patient complained of a feeling that something else was inside her after the baby had been delivered and after-birth removed. She asked the women in attendance to feel her stomach, and they later reported that they could feel something inside her. Despite this, she was up and about the next day, in accordance with the Eskimo practice. On the third day, however, she was back in bed with complaints of stomach pain, and an old woman was called in to help. (This woman also served as an informant.) She looked at the patient and explained to her that the pains were due to contractions of the womb. This seemed to quiet the patient for about two more days. Then, at night, she aroused her husband and some children who were sleeping in the tent to say that a fox had got into the tent and that its barking was disturbing her. He got up and looked around, as did the children, but they found nothing. Tooktook then said the fox had entered her. The next day the old woman returned to visit the patient, and when she was told what had transpired during the night, she told the patient that this occurrence was due to a sin that the patient had committed and that she had better confess. At first, the patient refused to do so but two days later when the stomach pains were worse, and when an additional symptom appeared—a peculiar feeling of itchiness on her back—the patient proceeded to tell about the fox-stealing incident. On hearing this story, the old woman said that this was the cause of her complaint and that it was too bad that Tooktook had failed to confess earlier.

From this time until the spring of the next year, when she was removed, a period of about four months, the patient manifested a good deal of unusual behaviour. She began to act like a fox, her voice becoming more and more fox-like. She would lie in bed and bark like a fox. She lost control of her bowels and bladder and she had to be fed like a child. She stayed in bed most of the time, constituting a total loss to her husband since she could no longer look after his needs. Often, she would awaken in the middle of the night and hum some of the familiar tunes. She had auditory hallucinations, hearing sounds that no one else heard, such as knocking at the door, an airplane and men talking. She also had at least one visual hallucination, seeing two women whom no one else could see. She talked incessantly, jabbering especially about the poor treatment she had received from her father. She was very noisy and would sing to herself. She frequently asked for a mirror. There was a good deal of imitative behaviour. She imitated the women chewing sealskins; she imitated the smiles and movements of others in the tent.

She tried to imitate vocal sounds but her voice had become so hoarse from barking like a fox that she could not do this successfully. Once, she jumped out of her bed in the middle of the night, and started to run for the door, completely nude, which is the way Eskimos sleep. Just as suddenly, she stopped, turned around and went back to bed.

Tooktook complained that the fox was moving higher in her body to a point where she could feel its fur in her mouth. When she stretched out her feet, they appeared to the people to look like fox paws that had been skinned. This was accepted as a manifestation of the fox spirit which had entered the patient because of her stealing.

Another complaint that the patient made was that a big penis was in bed with her. Two explanations were advanced for this: one was that it was punishment for the sin of incest that Tooktook was rumoured to have committed with her father; another was that the evil spirits were punishing Tooktook for using objects such as a stick to produce orgasm.

During the period of her illness, the patient attacked her husband once, attempting to claw him. This was the only incident of her trying to injure anyone. However, she did seem to possess great strength and, because she would spring up from her bed suddenly, she was tied to the bed. While she was tied down, the echolalia and echopraxia persisted. She tried to mimic someone who was scratching his head, and she was very upset until someone scratched her head for her since her bound hands prevented her from doing this herself. The restraint was unsuccessful since she would work her way loose. As a result of rather widespread fear of Tooktook, a small igloo with a barred entrance was built for her. Food was passed in to her. In this igloo, she kept talking and singing to herself. Her behaviour continued to deteriorate and for two weeks immediately preceding her removal, Tooktook was kept in a coffin-like box with an opening at the head end.

Native Treatment and Explanation of Illness

Her illness was explained as follows: When Analic, from whom Tooktook had stolen the fox, was born, an uncle pledged his services to help him fend off misfortune and enemies. As a result, when Tooktook stole the fox from Analic, his power resulted in the evil spirit of the fox entering her. Although she confessed her sin and also confessed having stolen other things, it was too late and the fox could not get out. Her father returned a fox to Analic but this, too, was of no avail. A group of elders prayed for her, but this was also in vain. She was in the clutches of the bad spirits and could not be released. Analic was powerless to help her since he dared not rebuke his guardian.

In February, 1944, because of the severity of her complaints and the peculiarities of her behaviour, the Eskimos brought Tooktook to the United States army hospital which was on the Island at the time. She was admitted for observation and treatment. No physical disability was found on admission. The report of the hospital doctor describes the subsequent events:

> By nightfall the patient became very restless and began to act abnormally, both in her facial movements and her speech. She then began to yell and jumped out of bed, attempting to bite the hospital orderlies. With the help of seven men she was placed back in bed and under a restrainer. She was given a hypodermic injection of morphine sulphate, ¼ gr., and followed by a capsule of Nembutal. For about an hour she was raving mad, violent and maniacal. She finally went to sleep and next morning was transferred from this Dispensary to a nearby Eskimo village. This Dispensary has no means or facilities to treat insane patients. Recommendation was to admit her to an institution for Mental Diseases for further observation and treatment.

Arrangements were made to follow the recommendation that Tooktook be removed and these arrangements were carried out in April, 1944.

Her illness is described as "tookikengimut", which is translatable as "she lost control of herself", and "pislangesaktook", which is best translated as "mad".

Course in Hospital

Patient was admitted to the Hospital for Mental Diseases, Brandon, Manitoba, on April 22, 1944. On admission, she was restrained to a stretcher; she did not speak, but made occasional growling noises, and spat from time to time. Physical examination was essentially negative. A formal mental status examination was impossible because of the language barrier. In hospital, the patient was confused and resistive to care. She attempted to bite the nurses on several occasions. She appeared to have no insight into her condition and made no attempt to establish contact with those around her, although she did converse for a short time with another Eskimo patient. She was destructive at times and threw dishes about the room. She was confined in a single room where she continued to be restless and where she actively hallucinated. She was diagnosed as schizophrenia, catatonic type.

Gradually, she began to settle down and become a little more co-operative. She was taken out of the single room and was able to take walks and to go on a picnic. In July, 1944, she ran away while out for a walk. One of the nurses caught her before she had gone more than 100 yards and she was returned to the ward where she was placed on cold wet packs. She became very resistive and this treatment had to be discontinued.

During the remainder of her first year in the hospital, Tooktook's behaviour fluctuated a great deal. At times, she was quiet and co-operative but, more often, she was hyperactive and combative. For all of 1945 and 1946, her illness showed periodic features of catatonic stupor. She would lie on her bed for long periods of time with her eyes closed. There was also a good deal of weeping. In 1947, she became quarrelsome and had fights with other patients. She also began to hoard and had to be raided each day to reclaim the clothes she had taken from other patients. Her own clothing was untidy and torn. During the next three years, she continued to be a very difficult patient. She was irritable, noisy, destructive, resistive and dirty. At times, she required single room care. Often, the nurses had to dress her. In December, 1950, she was diagnosed as having active tuberculosis and was placed in the isolation ward. Here, she was sad and uninterested in her surroundings. At the beginning of June, 1951, she appeared weak; physical examination showed some disorder of breathing. Streptomycin was given but her condition deteriorated rapidly and on June 15, 1951, she died of tuberculous meningitis.

REMARKS

These three cases suggest a basic schizophrenic process at work, similar to that found in patients from our own society. The characteristic withdrawal from reality, the hallucinations and delusions, and the deviation from the social norm is present in each instance. In two of the three cases, relatives of the patients showed sufficient instability to suggest some constitutional factors at work. In one case, the stress of pregnancy may have been a contributing physical factor. The hallucinations and delusions, while expressed in terms compatible with Eskimo culture, could otherwise readily be duplicated on the wards of any mental hospital. It is true that the content of each illness is different from that which we would encounter in our society. This is as might be anticipated since the man-made culture and the environmental setting of the Eskimo is quite different from those to be found in any segment of Western society. The structure and process of the illness, however, as distinct from its content, is essentially like the structure and process of schizophrenia in our society.

This conclusion coincides with that reached by A. A. Brill (1913), after his consideration of "Arctic Hysteria":

> And yet is there really so much difference between the hysterical mechanisms as manifested in piblokto and the "grande hystérie" or other modern hysterical manifestations? We may answer unhesitatingly that the difference is more apparent than real. The deeper determinants as we have seen are the same in both. With due apologies to Mr. Kipling we may say that the modern lady and Eskimo Judy O'Grady are the same under the skin.

Similarly, in considering the manifestations of mental disease in different historical eras, Gregory Zilboorg (1938) concluded that

> some forms of mental disease have not changed, although their ideational content has changed materially . . . the mental mechanisms of schizophrenic of today in a Chicago institution are the same as those of the monomaniac in the Salpêtriere during Esquirol's time, the bewitched in the jails of Cologne during the sixteenth century . . .

One might also cite the opinion of a physician who subsequently became a noted anthropologist. In answering the question as to whether or not symptom-formations of Westerners differ from symptom-formations in members of other communities, C. G. Seligman (1932) concluded,

> the symptom-formations of members of the Caucasian race of our own civilization do not substantially or basically differ from those of people of other races, whether of lower or equal culture.

Finally, a recent survey of psychotics among the native population of Saipan led to the following conclusion:

> We believe that the "relativity" concept of psychosis is based on criteria which do not include all of the essential symptoms. Our experience with psychotic patients in our own culture has led us to the conviction that mental illness manifests itself not only in ideas and emotional attitudes which differ from

the accepted norms, but also in personality disturbances which affect the whole sphere of behaviour and result in an indifference to the most fundamental and universal human realities, such as self-care, working ability, and relation to other individuals. We believe that such a syndrome would stand out as abnormal in any culture, though its particular form and content may differ in different settings (Joseph and Murray, 1951).

Since the foregoing material tends substantially to support these conclusions, we are left with some real questions concerning the relative nature of mental illness. Perhaps we are indeed ready to move closer to that hoped-for stage described by Ruth Benedict (Benedict, 1937), when we will be able to understand abnormal behaviour in more culturally universal terms. The achievement of such understanding will certainly not minimize the significant influence of social factors in mental illness. It is surely more than coincidence that the three illnesses described here occurred in a social climate of great anxiety and unrest. However, the data would not support a broad leap from this observation to the conclusion that the particular social climate in the given society gave rise to peculiar illnesses specific to a set time and place. Yet, it is precisely this leap which is made by some anthropologists who speak of "bizarre native psychoses", (La Barre, 1949) thus opening the way unwittingly for pseudo-scientific racist explanations, among others, and denying the possibility of finding a common nucleus of aberration. The value of cross-cultural psycho-pathological data is lost if they are used only to bolster the contention that there are rare and esoteric mental illnesses relative to a certain society at a certain time. The fact that there appears to be a common denominator to mental illnesses, regardless of the social context, negates the hypothesis that mental disease is unique to the society in which it occurs. It is altogether likely that the incidence of mental disease varies from one society to another (Hare, 1952). It is similarly true that the content of mental disease is related to the society in which it occurs (Yap, 1951). However, the foregoing data suggest that every people showing aberration will manifest a common nucleus of aberration which is to be found in all mankind.

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VARIATIONS IN THE BLOOD LEVELS OF ACETOIN AND BUTANE-2:3-DIOL IN NORMAL INDIVIDUALS AND MENTAL PATIENTS

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The biochemical aspects of manic-depressive psychosis have been adequately reviewed by McFarland and Goldstein (1939). From previous investigations, it is apparent that there is a marked alteration in carbohydrate metabolism mainly associated with a change in glucose tolerance. This phenomenon is related to alterations in emotional state and there is no suggestion that it is the cause of the mood swings which occur periodically in this type of psychosis. Apart from these variations in the control of carbohydrate metabolism, it has so far not been possible to demonstrate any changes in the blood levels of any products derived from carbohydrate metabolism.

During investigations in cases of *diabetes mellitus* in which the control of the disease was inadequate, it was found that the blood acetoin (AMC) level was raised. In view of the decreased glucose tolerance observed during the depressed phase of manic-depressive psychosis by McCowan and Quastel (1931), Hackfield (1932), Northcote (1932), and Ström-Olsen (1932), it was thought to be of interest to investigate variations in the AMC and butane-2:3-diol (2:3BG) blood levels during the mood phases of this mental disorder. In addition, a similar investigation was carried out on a heterogeneous collection of psychoneurotic individuals.

In animals, Stotz, Westerfeld and Berg (1944) demonstrated that acetaldehyde, when injected intravenously, produced a rise in the blood level of AMC whilst pyruvate and a mixture of pyruvate and ethyl alcohol did not. They were of the opinion that AMC was rapidly metabolized, thus differing from Greenberg (1942) who showed a slow rate of disappearance of injected *dl*-acetoin. Dawson and Hullin (1952) have demonstrated that intravenous pyruvate injections in decerebrated cats will produce a rise in AMC blood level but their results agree with Stotz *et al.* in that injected AMC in similar preparations is rapidly metabolized.

In micro-organisms, AMC and 2:3BG can be produced from pyruvate and glucose, the relative amounts of the two compounds produced depending on the substrate used as shown by Happold and Spencer (1952). Watt and Krampitz (1947) and, more recently, Juni (1950) have shown that AMC is produced from pyruvate by the following mechanism.

$$\text{Pyruvate} + \text{acetaldehyde} \longrightarrow \alpha\text{-acetolactic acid} \longrightarrow \text{AMC}$$

EXPERIMENTAL

Clinical material

The mental patients studied in this survey were at the Retreat, York, and were under the care of one of us (A.P.) who was responsible for their selection and classification.

Procedure adopted in collecting the blood samples

Except for the results shown in Table I where sodium citrate was used as an anti-coagulant, the blood collected intravenously was immediately ejected from the syringe into a graduated centrifuge tube containing 10 ml. cold (10 per cent. w/v) trichloroacetic acid and the mixture thoroughly shaken. All samples were assayed as quickly as possible afterwards but were kept at 0° during the intervening period.

Analytical methods

For the results shown in Table I, AMC was estimated by oxidizing it to diacetyl under the conditions used by Stotz and Raborg (1943) and then determining the diacetyl according to the method of White, Krampitz and Werkman (1945). All other estimations for AMC and 2:3BG were carried out using the method of Happold and Spencer (1952), slightly modified as follows for use on blood samples.

The accurate volume of the blood taken (ca. 10 ml.) was measured in the graduated tube after centrifuging for 20 minutes. The supernatant solution was then decanted and the precipitated blood proteins re-extracted by stirring with more cold trichloroacetic acid (12 ml.). After further centrifuging, the supernatant solutions were combined and the volume of acid extract noted; preliminary experiments had shown that all the carbinol and glycol was removed by the two extractions.

AMC was assayed on an aliquot portion of the acid extract. The total of carbinol and glycol present was determined on a 6 ml. portion of the extract which was first adjusted to pH 7 by addition of sodium hydroxide solution (approximately 0·15 ml. of 40 per cent. (w/v) NaOH solution was required), the neutralization being completed by dropwise addition of 10 per cent. (w/v) NaOH solution, using bromothymol blue as external indicator.

The precipitated hydrazone was washed with 5 ml. of 5 per cent. (w/v) aqueous methyl alcohol to eliminate any possible interference from glucose in the blood filtrate.

Recovery experiments indicated that the method of Happold and Spencer as modified for blood samples was accurate to within ±5 per cent. and concentrations as low as 15 µg./100 ml. of blood could be determined.

TABLE I

Variations in the blood AMC level in different mental states

		Blood AMC (µg./100 ml.)		
Mental State	Subjects	Mean	±	S.E.M.
Normal	32	31	±	2·3
Depressed	46	50	±	8·2
Manic	35	49	±	7·7
Psychoneurotic	17	28	±	5·1

RESULTS

The clinical investigation was divided into four different attempts to determine whether a variation in AMC and 2:3BG blood levels could be correlated with mood swings in manic-depressive psychosis.

1. This was an investigation into the blood AMC level in a large series of mental patients who were in various stages of depression and mania but who had not received either electro-convulsive therapy or insulin shock treatment. A group of patients suffering from various psychoneuroses was also investigated.

The difference between the AMC level of the manic and depressed phases and that of normal individuals and psychoneurotics is just significant ($p<0\cdot05$).

2. Using the more sensitive, Happold and Spencer method for AMC determinations and including, in addition, 2:3BG estimations, a further series of new admissions to the Retreat was investigated before E.C.T. or insulin shock therapy had been instituted. The normals were volunteers from the staff of the hospital.

TABLE II

Variations in the blood AMC and 2:3BG level in certain mental states

		Blood AMC (μg./100 ml.)			Blood 2:3BG (μg./100 ml.)		
Mental State	Subjects	Mean	±	S.E.M.	Mean	±	S.E.M.
Normal	13	49	±	7·0	232	±	13·6
Depressed	42	73	±	8·7	237	±	18·6
Manic	6	85	±	18·1	406	±	105·9

The increase in blood AMC level above the normal range in both the depressed and manic phases is just significant ($p<0\cdot05$). The 2:3BG level in the depressed phase is within normal limits and, in the manic phase, is too variable to draw any conclusions from the small number of individuals studied.

3. The previous two studies had been carried out on blood obtained during the absorptive phase after a meal (the samples had been taken within 30 minutes after breakfast). In view of the rather wide variation in results obtained, blood taken in the fasting state before breakfast was used for subsequent investigations. In addition, treatment by sedation for the 48 hours prior to blood sampling was discontinued. No other form of physical treatment had been instituted as in the previous surveys.

TABLE III

Variations in the fasting blood level of AMC and 2:3BG in cases of depression

		Blood AMC (μg./100 ml.)			Blood 2:3BG (μg./100 ml.)		
Mental State	Subjects	Mean	±	S.E.M.	Mean	±	S.E.M.
Normal	22	74	±	6·9	175	±	13·1
Depressed	22	148	±	18·7	204	±	26·2

In normal individuals the blood AMC level is increased in the fasting state ($p<0\cdot025$) whilst the 2:3BG shows a significant decrease ($p<0\cdot01$) as compared with the non-fasting state (compare Table II).

The fasting blood AMC level is significantly increased in the depressed phase ($p<0\cdot002$) without any significant change in the 2:3BG level.

4. This investigation concerns two individual patients (one male, one female) with a type of manic-depressive psychosis showing rapid fluctuations

TABLE IV

Variations in the fasting blood concentrations of AMC and 2:3BG in manic-depressive psychosis

Mental State	No. of estimations	Blood AMC concentration (μg./100 ml.)			Blood 2:3BG concentration (μg./100 ml.)			Total concentration of AMC+2:3BG (μg./100 ml.)			2:3BG AMC ratio
		Mean	±	S.E.M.	Mean	±	S.E.M.	Mean	±	S.E.M.	
Normal group	30	83	±	4·7	194	±	6·6	277	±	5·7	2·3
Normal phases of psychotic group	11	89	±	10·6	168	±	19·3	257	±	15·0	1·9
Depressed phases of psychotic group	17	111	±	13·8	223	±	21·3	334	±	17·7	2·0
Manic phases of psychotic group	17	52	±	7·8	284	±	14·1	336	±	11·0	5·5

in mood swing. Blood levels of AMC and 2:3BG were determined in the fasting state at twice-weekly intervals and correlated with the mood swings. In both cases, all physical treatment (including the use of sedatives) was withheld during the periods of the survey. The results embrace two separate surveys on each patient at an interval of 3 months; each survey lasted 5-6 weeks. Table IV represents the mean values obtained over a considerable number of mood swings; included in the table are values obtained in a similar way for a group of 3 normal individuals.

During the normal phase of the psychosis, the blood levels of AMC and 2:3BG do not differ significantly from the control group. The blood AMC level in the depressed phase is significantly raised above that of the control group ($p<0\cdot02$); it is not significantly raised above the level found during the periods of normality of the psychotics. The 2:3BG levels are not significantly different from the normal level.

In the manic phase, the blood carbinol level is reduced below the level of both the control group ($p<0\cdot002$) and the normal phases of the psychosis ($p<0\cdot01$). The 2:3BG levels in the manic phase are significantly higher than either of the two normal groups ($p<0\cdot002$).

The 2:3BG-AMC ratio is not significantly altered in depression but is markedly increased in mania. The total concentration of carbinol and glycol is significantly increased in both the manic and depressed phases ($p<0\cdot025$).

5. The effect of intense physical activity on 5 normal subjects was studied by means of a cycle ergometer. The test was carried out before breakfast. A fasting blood sample was taken and the subject then vigorously exercised for 20-30 minutes against a 3·5 kilogram load of the ergometer. Within 2 minutes of the completion of the exercise a second blood sample was taken as previously and both samples assayed for pyruvate, AMC and 2:3BG.

TABLE V

The effect of vigorous exercise on the blood levels of AMC, 2:3BG and pyruvate in five normal fasting subjects

	Before exercise			After exercise		
	Mean	±	S.E.M.	Mean	±	S.E.M.
AMC (μg./100 ml.) ..	63·2	±	10·0	65·6	±	22·7
2:3BG (μg./100 ml.) ..	183·4	±	46·7	196·2	±	25·0
Pyruvate (mg. %) ..	1·44	±	0·32	2·21	±	0·39

There was no significant difference between the blood concentrations of AMC and 2:3BG before and after exercise. The increase in pyruvate level after exercise was characteristic of changes associated with strenuous exercise.

DISCUSSION

Acetoin and butane-2:3-diol are normally present in blood, the amount varying within narrow limits in normal individuals, with higher carbinol levels in the fasting state. From the results of previous workers, pyruvate would appear to be the main source of AMC although acetaldehyde could be a precursor in combination with pyruvate. The rate of production *in vivo* is unknown and AMC formation would appear to be a side reaction as far as pyruvate metabolism is concerned.

In the cases of manic-depressive psychosis, two features concerning AMC are apparent; the extreme variability of the blood levels and the rise which occurs in the depressed phase. This rise could either be a manifestation of an over-production or of a decreased utilization and is not related, in the depressed phase, to an altered equilibrium state between AMC and 2:3BG since the ratio of the levels of the two compounds is within normal limits.

In the manic phase, however, although there is an increase in the total amount of carbinol and glycol produced, there is also a change in the relative amounts of these compounds. Thus, manic-depressive psychosis in the fasting state is characterized not only by an increased total of AMC and 2:3BG in the blood, but in the manic phase, an increased amount exists as 2:3BG. In mania, the AMC concentration in the non-fasting state is increased whilst it is significantly lower than normal in the fasting state. This is the reverse of the change observed in normal individuals where the carbinol level is greater in the fasting state than in the non-fasting state. Thus the alteration in metabolism involves not only variations in either the rate of production or utilization, but also variations in the amount of reduction of AMC at the equilibrium point.

Manic-depressive psychosis is a disease entity which embraces alterations in mental state together with profound changes in physical activity; the physical and mental symptoms are so inter-woven that it seems impossible to separate them—indeed it would not be justifiable to attempt to do so in any consideration of the whole disorder.

In the mentally normal subjects, intense, prolonged physical activity produces no significant alteration in AMC and 2:3BG blood levels. It is, however, doubtful whether even the most intense activity which can be provoked in normal individuals can be compared with the activity observed in the manic phases of manic-depressive psychosis. This may range in the latter case from rapid changes of ideas and flights of fancy, to intense, frenzied physical activity leading to exhaustion. Attempts to exclude the possibility that the physical manifestations are responsible for alterations in blood chemistry are likely to be abortive owing to the difficulty of simulating such activities in normal individuals. Consequently we have regarded manic-depressive psychosis as an entity and used normal subjects behaving in a normal manner as controls. This means, of course, that at this stage of the investigation we cannot conclude whether the changes observed are due to the altered mental state interfering with metabolic activity, whether the altered physical activity is responsible, or whether the metabolic alteration leads to a change in mental function. In view of the widespread distribution in the body of the enzymic mechanism for producing AMC no indication concerning the site of the alteration can be inferred from this consideration.

Since fasting alone will change the level of carbinol in the blood, it would seem that AMC production (or its rate of destruction) is governed by some controlling mechanism and it may be that, in cases of manic-depressive psychosis, this controlling mechanism is disturbed.

The results obtained indicate that a metabolic disturbance does occur in manic-depressive psychosis and is peculiar to the psychosis in so far as it shows a periodicity which can be correlated with the mood swings; it cannot be simulated in normal people by alterations in physical activity.

Summary

1. In the non-fasting state the blood acetoin (AMC) level of a group of mental patients in the manic and depressed phases was higher than that of a normal group or of a group of psychoneurotic individuals: the degree of variation in blood level was also greater in the psychotic group.

2. In normal individuals, the blood AMC level in the fasting state is raised and the butane-2:3-diol (2:3BG) level reduced as compared with the levels in the non-fasting state.

3. In the fasting state, manic-depressive psychosis is characterized by an increased total concentration of AMC and 2:3BG in the blood. In the depressed phases of the psychosis, the carbinol level is raised but no significant change in the glycol concentration occurs. In the manic phases, the blood carbinol level is reduced whilst the glycol level is greater than normal. These variations produce a marked change in the 2:3BG-AMC ratio in the manic phase.

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PRELIMINARY OBSERVATIONS ON THE PSYCHIATRIC USES OF CHLORPROMAZINE (LARGACTIL)

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THE possible psychiatric applications of chlorpromazine hydrochloride (Largactil) have been discussed by various authors in Continental journals; particularly by Delay *et al.* (1952) and Sigwald and Bouttier (1953)—the latter including in their paper a summary of publications devoted to this aspect of the drug's activity.

The present paper describes the use of chlorpromazine hydrochloride in mental hospital practice in this country, observations on a series of 50 cases being presented.

CHEMICAL PROPERTIES

Chlorpromazine hydrochloride is one of the series of alkyl amine derivatives of phenothiazine, its full name being 3 chloro-10(3'-dimethylaminopropyl) phenothiazine hydrochloride. It is closely related to promethazine hydrochloride (Phenergan): promethazine-8-chlorotheophyllinate (Avomine) and ethopropazine hydrochloride (Lysivane). It is available in this country as Largactil (May & Baker) and is also known by the code figures M & B 2378 and, on the continent, 4560 R.P.

It is a white crystalline powder, readily soluble in water and may be administered by oral, intramuscular or intravenous routes.

PHARMACOLOGY

The following short account has been abstracted largely from the account given by Courvoisier *et al.* (1953). Much of it derives from animal experiment, and no attempt will be made here to present a comprehensive survey of the complicated pharmacological actions of the drug.

For the purposes of this paper, chlorpromazine may be considered as exhibiting two basic types of activity—hormone antagonism and central nervous inhibition.

(a) *Hormone Antagonism*

(I) *Anti-adrenaline Activity.* Chlorpromazine neutralizes the hypertensive effects of adrenaline and nor-adrenaline, antagonizes adrenaline-induced uterine spasm and protects experimental animals from otherwise lethal doses of adrenaline. It is suggested that the diminution in vaso-pressor reflexes that can be demonstrated after its use indicates that it inhibits sympathetically mediated autonomic functions. Likewise, in common with some other adrenergic blocking agents (e.g. Dibenamine) chlorpromazine exerts a protective function on animals subsequently subjected to haemorrhagic or traumatic shock.

(II) *Anti-acetylcholine activity* can also be demonstrated (e.g. neutralization of the hypotensive effect of intravenous acetylcholine) but is much less marked than the anti-adrenergic activity.

(III) *Anti-histamine activity*. Unlike the related promethazine hydrochloride, chlorpromazine exerts very little anti-histaminic activity.

(b) *Central Nervous Inhibition*

In general, chlorpromazine is regarded as a central depressant. It has been shown experimentally to exert *a hypothermic effect* and *to reduce metabolic activity* in dogs and mice and clinically these two actions have been utilized in the technique of artificial hibernation in the prevention and treatment of traumatic haemorrhagic and operative shock.

Evidence from animal experiment likewise indicates that the drug exercises *an obliterative effect on conditioned reflex patterns*—rats conditioned to climbing a rope on the ringing of a bell losing the response following its administration in spite of retaining full muscular power and co-ordination. (A possibly similar loss of a conditioned response in a human subject will be described subsequently.)

Chlorpromazine antagonizes the stimulant effect of caffeine and amphetamine, and reduces the convulsive effects of nikethamide and nicotine, but exerts little action on strychnine convulsions. In addition, it appears to exert *a soporific effect* of its own, and it is claimed that it renders the higher centres of the C.N.S. more susceptible to other cerebral depressants. This latter property has been utilized clinically in the technique of potentiated anaesthesia, and to enhance the activity of barbiturates and opiates ("potentiation").

Administration

The preparation Largactil is available in the following forms:

Tablets, containing 25 mgm. chlorpromazine hydrochloride.

Ampoules, containing 2 c.c. of a 2·5 per cent. w/v solution (each 1 c.c. containing 25 mgm. chlorpromazine hydrochloride).

In the present series both oral and intramuscular routes have been used, and the choice of the appropriate route in any particular case has been a matter of some difficulty. The clinical results suggest that the oral route is less effective than the intramuscular, which, however, carries with it the inconvenience of the injection itself and the risk of local irritant reactions at the site of injection. Subcutaneous administration appears to be highly irritant and should be avoided.

Dosage

Various schemes of dosage have been tried and an entirely satisfactory one has not yet been determined. The following table indicates the routine scheme used in this series:

Day	I.-M. Dose	Oral Dose	24 hour Total
1	25 mgm. b.d.	—	50 mgm.
2	50 mgm. b.d.	—	100 mgm.
3	50 mgm. t.d.s.	—	150 mgm.
4	50 mgm. 6-hourly	—	200 mgm.
5	50 mgm. 6-hourly	—	200 mgm.
6	50 mgm. 6-hourly	—	200 mgm.
7	50 mgm. 6-hourly	—	200 mgm.
8	50 mgm. 6-hourly	—	200 mgm.
9	50 mgm. 6-hourly	—	200 mgm.

10	50 mgm. b.d.	50 mgm. b.d.	200 mgm.
11	50 mgm.	50 mgm. t.d.s.	200 mgm.
12	—	50 mgm. t.d.s.	150 mgm.
13	—	50 mgm. b.d.	100 mgm.
14	—	25 mgm. b.d.	50 mgm.

The aim has been to produce a 200 mgm. daily total by the fourth or fifth day of treatment, to maintain this level for a period varying from one to seven days (depending on the reaction of the patient and the development of irritation at the site of injection), and then gradually to replace the intramuscular by oral administration, with subsequent reduction of the daily total to 50 mgm., this then being maintained as long as warranted by the clinical response.

Experience in this series leaves little doubt that in order to produce the maximal response one must, in the majority of cases, initiate treatment by intramuscular injection. The response to initial oral administration is unquestionably less, and in doses less than 100 mgm. per 24 hours may be clinically insignificant (even though the presence of mouth dryness and tachycardia indicate that the drug has been absorbed). Having, however, obtained a clinical response by initial intramuscular administration it is frequently possible to maintain it orally, and recent attempts to substitute oral administration on the third day of treatment following 50 mgm. intramuscularly on the first, and 100 mgm. on the second, have been successful in patients exhibiting anxiety symptoms without any severe behaviour disturbances. Having achieved such substitution, the daily total is then built up to 200 mgm. on the fourth day, maintained and subsequently reduced as in the routine scheme.

In spite of this modification, the necessity for initial intramuscular administration remains, and has limited the use of the drug in this series to hospital in-patients. There can be little doubt that considerable variation in the scheme of dosage represented here may well occur before the optimal procedure for using the drug is arrived at.

MANAGEMENT OF THE CASE UNDER TREATMENT

During the first four days of treatment patients are confined strictly to bed and for the first two days are exhorted to remain supine. This is in order to prevent the occurrence of postural hypotensive attacks (v. inf.) which although apparently not dangerous can be alarming. On the fourth day they are allowed to sit up and to visit the toilet in charge of a nurse and if nothing untoward occurs, they are then allowed up progressively more each day and the majority return to full ward activity by the time they have reached their maintenance dose of 25 mgm. b.d.

All other forms of sedative are discontinued twenty-four hours prior to the first injection and written and verbal warning is given to the nursing staff of the possible danger of "potentiation". Throughout the course of treatment, extra sedatives are only given under careful supervision, and in small quantities, although the experience gained with this series tends to suggest that a dangerous degree of potentiation is unlikely. One patient on the full 200 mgm. daily level was inadvertently given an additional 7½ grains of intramuscular sodium amytal without the production of any effect other than a good night's sleep.

Because of the atropine-like effect of the drug on salivation, precautions are taken to prevent the development of oral sepsis, and careful attention to oral hygiene is insisted upon.

Injections are given deep into the buttock—experience having shown that it is better tolerated there than into the thigh muscles. Recently, physiotherapeutic measures have been taken to maintain muscle tone in the muscles involved by exercise and massage, as it is felt that this may help to combat some of the irritant responses to the injections to be described below.

Throughout treatment, twice-daily temperature, and pulse and respiration rate recordings are kept, B.P. recordings are taken at varying intervals, and a full blood picture and urinalysis is obtained prior to the onset of treatment and repeated regularly throughout—particular attention being paid to the W.B.C. count.

Each patient is examined physically prior to treatment and the presence of any of the following conditions is, at present, considered to be an absolute contraindication:

(I) A white blood cell count persistently below 5,000 per c.mm.
(II) Any evidence of infection—however local or trivial.
(III) Any evidence of cardiac insufficiency, or a pulse rate persistently over 90/min.

Further experience may show that these contraindications should be amended, but the present series has shown that the drug inevitably produces a tachycardia which is sometimes marked, and that in some cases it exerts a leucopenic effect on the peripheral blood. The possibility of overtaxing a damaged myocardium or of diminishing the leucocytic response to infection must therefore be kept in mind.

SIDE-EFFECTS

Chlorpromazine possesses wide physiological activity, and concentration on one aspect of its activity—as in this case, the psychiatric, results in the appearance of the other activities as more or less troublesome side-effects. Because these have a definite bearing on the management of the course of treatment, it has been thought appropriate to describe them here.

(1) *Postural hypotensive attacks*

During the first three or four days of treatment, and occasionally throughout, patients feel giddy and unsure of themselves on standing up. Three of the present series have momentarily blacked out and fallen to the floor as the penalty for ignoring the caution to remain in bed—recovering without incident in a matter of minutes. To minimize this unpleasantness, patients have been confined to their beds at least until they have reached their maximum daily total (usually 200 mgm.).

As with many of the side-effects to be described, there is a tendency for these attacks to lessen in frequency and severity as treatment proceeds, even though the daily total of the drug given remains constant.

No systematic attempt has been made in this series to study the blood pressure changes during treatment. The recordings that have been taken have shown only an occasional drop in pressure of significant proportions, but recent experience suggests that the time-relationship between the taking of the recording and the administration of the drug is of importance in demonstrating its full hypotensive effect—which would appear in some cases to be of short duration only. Recordings during or shortly after hypotensive episodes have, on the other hand, shown considerable reduction (systolic pressure 80 to 90, diastolic 60 to 70).

(2) *Dryness of mouth*

This has been a constant finding and may frequently be encountered within half an hour of the first injection. There is a tendency for it to diminish towards the end of the course of treatment, but many patients experience it as long as the drug is continued. Its maximal inconvenience is nocturnal, but can be minimized by ensuring that fluids (orange squash appears the most effective) are always available, and that nursing attention is directed towards general measures of oral hygiene.

(3) *Tachycardia and palpitation*

This is perhaps the most reliable clinical indication of the activity of the drug, and the majority of patients in the present series have mentioned the existence of palpitation by the second or third day.

The rise in pulse rate follows closely upon the administration of the drug and is tending to diminish by the time of the next. Rates between 120 and 140 per minute have been common, but in only one case has there been any evidence of cardiac distress. One can, however, imagine difficulty arising in this respect if it were wished either to use doses of more than 200 mgm. daily or to give chlorpromazine to subjects with cardiac insufficiency.

The tachycardia subsides rapidly on withdrawal of the drug.

(4) *Blood changes*

No significant changes have been noticed in the R.B.C. or Hb. per cent. levels. As mentioned previously, however, the W.B.C. level in the peripheral blood tended to fall in a disturbing number of patients undergoing the full course of treatment (11 out of 23 cases).

This leucopenic effect has been noticeable in the second week of treatment and has persisted until the drug has been withdrawn or reduced. Patients receiving only oral administration have shown only the normal variation in their counts. In only one instance has the leucopenia reached a figure below 3,000 per c.mm. (rising spontaneously to the pre-treatment level around 6,000 on reduction of the daily total of chlorpromazine from 200 to 50 mgm.) and there has been evidence that even in the presence of this leucopenic response the patient retains the ability to produce a normal leucocytic response to infection. In spite of this, however, it would seem desirable that a close watch should be kept for any agranulocytic or aplastic marrow changes, and that patients with any such tendencies should be excluded from chlorpromazine medication until the effects of the drug on the marrow have been fully investigated, particularly in those subjected to prolonged maintenance dosage.

In addition to the above findings it has recently been noticed that there is a tendency for the E.S.R. to rise during treatment, sometimes as high as 40-50 mm. (Westergren with P.C.V. correction).

(5) *Pallor*

By the end of the first week of treatment patients receiving the full intramuscular course have been noticed to be pale and somewhat ''pinched'' in appearance. A patient responding well to full dosage characteristically presents a degree of pallor which, in combination with the listless somnolent psychic state to be described below, may well give rise to anxiety in those witnessing it for the first time. The pallor tends to persist until treatment is discontinued, or the dose considerably reduced. The impression that such patients are chilled has only been substantiated by any appropiate subjective experience in one case, and the body temperature has not been found to be significantly altered in any case.

The absence of cosmetics makes this side-effect more noticeable in men.

(6) *Local irritation at site of injection*

In the present series the incidence of irritative phenomena at the site of injection has been very variable and cannot, as yet, be entirely explained.

A single injection properly administered into the buttocks is relatively painless in the majority of cases. Repeated injections, however, cause discomfort, possibly as much from the bulk of fluid used as from any inherent irritant property of the solution. In six patients, hard, tender and remarkably circumscribed masses have developed deep in the gluteal muscles at the site of injection during treatment. One progressed to skin ulceration, the others subsided without sequelae.

Injection into the quadriceps muscle mass, on the other hand, has caused constant discomfort accompanied by low grade inflammatory reaction. In one patient, this reaction assumed alarming proportions, both thighs becoming greatly swollen, erythematous and tender; with inguinal adenitis, pyrexia (101°) and a leucocytic response of 20,000 per c.mm. This state of affairs lasted for three days and then subsided rapidly, without sequelae; the patient concerned being transferred to oral dosage and doing well. Laboratory investigation of the solution used, carried out by the manufacturers, revealed no alteration in clinical properties, and in the absence of any evidence of subcutaneous injection this response, which occurred on the second day of treatment, may perhaps be considered as allergic in nature.

As an empirical procedure this patient (and any other showing evidence of an inflammatory response) was given 1 gramme Aureomycin daily until the condition had subsided.

It has been suggested that the circumscribed masses that can be felt in the gluteal muscles following chlorpromazine injection may bear some relation to the fact that the drug produces a listless anergic state in the patient, accompanied by a varying degree of hypotonia—the combination of these two factors possibly retarding the rate of absorption from the injection site. It has been noticeable that the patients most affected have been women and that, with one exception, they have been neither overactive nor excited prior to treatment. No difficulties have been encountered in using intramuscular administration in any of the catatonically or maniacally excited male patients.

To minimize any such factors that may be operative, physiotherapeutic massage and exercises have been initiated, but it is too early to draw any conclusions from the results. There can be no doubt, however, that the occurrence of irritation at the site of injection has been the major drawback to using chlorpromazine in the manner described here.

(7) *Overdosage*

Two patients in this series presented responses which were considered to represent a state of intoxication, although the factor of personal sensitivity to the drug may have played a part, in as much as larger doses have been given for longer periods without producing the same response in other patients.

Both patients concerned entered a state probably best described as one of dissociation. They became dazed and bewildered, and unable to make effective contact with their environment although apparently aware of it. Both became incontinent, the one of urine, the other of urine and faeces, a state neither had exhibited previously. One showed marked perseveration in his speech, repeating words and phrases as though endeavouring to recall their meaning, the other became retarded almost to the point of mutism, with only occasional monosyllabic replies to questioning. Both had previously been agitated and overactive and both had exhibited considerable press of talk. Both required full nursing attention in respect of hygiene and feeding and the comparison between the picture they presented and that sometimes encountered following a prefrontal leucotomy was independently made by several observers.

The conditions under which this state of affairs occurred were closely similar in the two cases, both having been raised to the 200 mgm. level abruptly and by the intramuscular route, the one on the second day of treatment, the other on the third. On reduction of the dose by half, and with further reduction two days later to a 50 mgm. daily total, the acute symptoms described above receded, and had reached negligible proportions by the seventh and tenth days respectively of the withdrawal period. In both cases, the 50 mgm. (oral) daily maintenance dose was continued for a further week and, in one case, the manic reaction which had been present prior to treatment did not return and the patient returned home without further treatment. In the second case, the agitated depressive symptoms returned as the symptoms of intoxication receded, and required a subsequent short course of E.C.T. to dispel them.

THE CLINICAL PSYCHIATRIC RESPONSE

From a psychiatric point of view the clinical responses have varied so widely that their orderly presentation is difficult.

In patients in whom a significant response has been obtained, it has been seen to best advantage towards the end of the first week of treatment, after which time there is a tendency for the effects of the drug to lessen, even though no change is made in the dosage. This lessening of effect is particularly noticeable in respect of the side-effects of chlorpromazine but may also be observed to occur in the "psychiatric" response. Experience in this series suggests that if no useful response has been obtained by the seventh or eighth day of the full course, it is unlikely to be obtained thereafter.

Objective and subjective responses are frequently to be noticed within thirty minutes of the first injection, and in all patients by the second day. They comprise various combinations of the following factors:

(1) A dryness of the mouth.
(2) Tachycardia (from 90 to 140).
(3) Vertigo and a sensation of epigastric "sinking" if not lying down.
(4) A quietening of restless and disturbed patients, a lessening of "tension" symptoms in anxious patients and a tendency to drowsiness or sleep in all patients.

These effects occur in varying degrees of intensity and last for a variable period, but have usually passed their maximum within four hours of any particular injection, except in the case of the "sedative" action of the drug which may persist for six or more hours. As a rule it has been necessary to establish six-hourly administration in order to maintain any beneficial response produced at its maximum. With oral administration, the tachycardia and dry mouth may occur on the first day, but there has usually been a delay of two or three days before any significant "psychiatric" response has appeared.

The actions of chlorpromazine that have emerged from the present study as having particular relevance to clinical psychiatry may be considered under two headings. It should be borne in mind however that these responses have not been exhibited in the same degree by all patients, and that some have failed to show them at all.

(1) *Somnolence.* Those patients who have shown a useful clinical response

to the drug have all exhibited a somnolent effect varying from slight drowsiness to deep sleep. The somnolence is most marked within fifteen to twenty minutes of any injection, and even at its deepest it has been possible to rouse the patient easily and with little or none of the residual clouding of consciousness that one would expect to encounter after the use of comparable barbiturate sedation. The tendency actually to fall asleep diminishes after the first week of treatment, and has not interfered with the attempts then made to get the patient back on his feet, but throughout the course of treatment, whether or not the somnolent response is witnessed during the day, it has been noticeable that patients sleep soundly at night.

The somnolence varies in intensity, and may possibly be related to the mental state of the patient at the time. Acutely agitated, restless or excited patients have exhibited a greater response than have less disturbed patients, and the ability of chlorpromazine to produce rapid sedation and sleep in an acutely disturbed and excited patient has been its outstanding action in this series. One's impression is that this action is not in any way related to the underlying, aetiological, nature of the excitement—schizophrenic, manic and confusional excitements responding equally well.

The term somnolence has been chosen to describe this action in order to invite comparison between it and physiological sleep, and to make a distinction between it and the sedation that follows the use of barbiturates.

(2) *Psychic indifference*. This is perhaps the characteristic psychiatric response to chlorpromazine. Patients responding well to the drug have developed an attitude of indifference both to their surroundings and their symptoms best summarized by the current phrase "couldn't care less". As a result one has observed a loss of subjective anxiety and of distress arising from tension feelings; a reduction in the abnormal behaviour responses to hallucinatory experiences and a loss of interest in them; a lessening of conviction in delusional concepts; and a lessening of preoccupation with obsessional and hypochondriacal ruminations. Occasionally a state of euphoria has emerged, but one's impression is that this is secondary to the relief of tension rather than a primary euphoriant effect of the drug.

In the presence of the fully developed response—even in the absence of any somnolence, the patient lies quietly in bed, staring ahead, unoccupied and showing little or no interest in what is going on around him. He answers questions readily and to the point, but offers little, if any, spontaneous conversation. Questioning reveals that he is fully aware of his circumstances but that the distress they may formerly have caused him has gone. His posture and facial expression is one of relaxation and not infrequently relatives and staff comment on the fact that he looks younger.

One woman patient who prior to treatment had been in a state of agitation and tension as the result of severe external stress had lost her agitation and tension within thirty-six hours of the first injection and was lying quietly in bed, immobile for long periods but fully conscious. Whereas formerly any discussion of her troubles had precipitated tears and a restless agitation that subsided only after abreactive screaming bouts, she was now able to discuss the situation calmly, and contrasted her previous behaviour with her present inability to feel any distress at all. "I don't think you could make me cry now whatever you said to me" was her own description.

As with the somnolent effect, the degree to which this attitude of indifference developed varied considerably. Except in the two cases described as being intoxicated, it never necessitated nursing attention with feeding or hygiene;

indeed, the lessening of disordered behaviour that inevitably accompanied the development of indifference reduced rather than increased the need for nursing supervision.

Unfortunately, this response was not maintained in many patients whose daily total was reduced below 50 mgm.; relapses being frequent and occurring, at times, with surprising abruptness and completeness.

Miscellaneous Responses

Under this heading are described responses that occurred during the series, the nature and interpretation of which are not clear to the writer.

(1) *Increase in incidence of dreaming.* Three patients have spontaneously mentioned an increase in the frequency and vividness of their dream activity. In two cases, both women, the dreams were of nightmarish quality and resulted in requests for the treatment to be discontinued. The third case was that of a long-standing obsessionally neurotic man whose course of treatment produced a crop of dreams (which he duly recorded) in which was revealed unmistakable anxiety over his unaccepted libidinal drives, and which was accompanied by a progressively deepening depression during his waking hours.

It is perhaps worth recording in this context that of the three patients of the fifty involved in this series who requested that their treatment be stopped, two of them did so on the grounds of their unpleasant dreams. (The third request was made because of distressing palpitation.)

(2) *Muscular hypotonia.* Although patients exhibiting a full response to the drug did not appear to have lost any muscular power or co-ordination, the posture in bed and their facial expression has suggested that loss of muscle tone may have occurred. It has been noticeable that such patients tended to "mould themselves" to the bed; to accept any position they found themselves in without protest and to remain immobile on their backs for longer periods than a conscious bed-patient would normally do.

(3) *Febrile response.* Five patients in this series have become pyrexial (99°-101°) on the third or fourth day of treatment, and detailed physical examination has failed to reveal any adequate cause for this. The pyrexia has subsided uneventfully within the week and in the absence of any other explanation one may perhaps attribute it to an as yet unexplained action of chlorpromazine.

Selected Case Summaries

The following brief reports indicate the type of patient involved in this series and the response evoked by the use of the routine scheme of treatment, or modifications of it that have been shown to produce a useful clinical response.

The first 12 cases of the series may be summarized without individual description. They were given oral doses of 5 to 25 mgm. daily and apart from the presence of tachycardia and mouth dryness in some of them, no significant clinical response was observed. It should perhaps be pointed out that these particular patients were female chronic in-patients of either the paranoid-schizophrenic group (in which it had been hoped to produce a lessening in the intensity of their hallucination) or the neurotic-depressive group, whose social inadequacies necessitated hospitalization as much as their overt depressive or anxiety symptoms. It is possible that in a more therapeutically favourable group small scale dosage may have its use.

Of the remaining 38 cases, the following descriptions are representative. They have been grouped diagnostically, but this should not be taken to indicate that the writer considers the indications for the use of chlorpromazine correlate with the ordinarily used diagnostic categories.

(1) *R.B. Male, 23*

Acute schizophrenic excitement of catatonic type, with auditory hallucination and episodic impulsive violence. Acute symptoms present for 3 days prior to treatment, but two similar episodes in the past 3 years. The present episode had commenced five months previously, and had shown only partial and temporary response to combined E.C.T. and Deep Insulin Coma.

Treatment. First Course. Routine scheme of dosage, with 7 days at 200 mgm. daily level.

Response. There was a marked somnolent response following the first injection, with an accompanying decrease in his restlessness. By the third day his disturbed behaviour was in abeyance, he was sleeping for long periods and when awake lay quietly in bed. By the seventh day he was able to discuss himself and his illness coherently and exhibited a typical indifference to the hallucinations which had formerly distressed him—being able to disregard their taunting accusations. His mood was one of incongruous fatuity, but he was very much more in touch with his surroundings than at any time during the present breakdown and co-operated fully with the nursing staff, being allowed up from the tenth day.

He remained in this state until reduced to a 50 mgm. daily oral level, when, on the 23rd day of the course he relapsed suddenly and completely, becoming restless, aggressive and dominated by his hallucinations.

Second Course. Followed directly on from the first, and consisted of 7 days at 200 mgm. (I.M.I.) with subsequent reduction to 50 mgm. orally by the 12th day.

Response. The restlessness and aggression were brought under control by the second day, but he showed a less marked somnolent response and remained periodically distressed by his hallucinations. He was again allowed up on the 7th day, and his improved behaviour was maintained in spite of the continuing hallucination. He did not however regain the accessibility that had shown in response to the initial course. Treatment was discontinued on the 14th day without provoking any relapse into acute excitement. A pre-frontal leucotomy was eventually performed and produced what, to date, seems to be a very satisfactory result.

Opinion. A good symptomatic improvement, only partially maintained on withdrawal—perhaps the characteristic response of this series.

(2) *J.P. Male, 35*

Acute schizophrenic excitement. Patient violently resistive to all nursing attention, abusive and obscene in the extreme, and impulsively aggressive. Visual and auditory hallucinations and quite inaccessible. Nursed in protected room. Acute symptoms present for a week prior to treatment. Similar episodes in 1940 and 1946, with apparently full remission with no personality deterioration. No treatment during present illness except chlorpromazine.

Treatment. Routine scheme of dosage, with 7 days at 200 mgm. level and 4 weeks maintenance at 50 mgm. oral level.

Response. By the end of the first day his aggressiveness had subsided and he allowed attention to be given him without pouring abuse on those attending him. The following day he was feeding himself. By the fourth day he was exhibiting characteristic "somnolence" and "indifference" co-operating fully with the staff, conversing naturally and pleasantly and, as far as close observation and questioning could determine, no longer hallucinated. His aggression had subsided completely, and he was allowed up on the 10th day.

A month after the start of the course he presented no clinical evidence of schizophrenia apart from a certain detachment from his surroundings and a lack of appreciation of and distress at the significance of his illness—which may, in point of fact have been attributable to the action of the drug His behaviour was exemplary and he was an active and popular member of various hospital social clubs. He was discharged "recovered" three months after his admission to hospital and has remained well since.

Opinion. In view of his past history one cannot, of course, attribute the full change in the clinical picture to chlorpromazine, similar remissions having occurred in the absence of the drug. The immediate symptomatic response, however, can justifiably be so attributed, and was most impressive, a difficult nursing problem being brought under control rapidly and with minimal trouble.

(3) *B.E. Male, 34*

A schizophrenic of 5 years standing, with adverse heredity (schizophrenia, epilepsy, melancholia). Much influenced by auditory hallucination relating to his homosexual drives. At onset of treatment he was restless and hostile, noisy at times and occasionally openly aggressive in response to distressingly intense hallucination.

No adequate response to E.C.T. insulin, or pre-frontal leucotomy (April, 1952).

Treatment. Routine scheme of dosage with 5 days at 200 mgm.: 10 days at 100 mgm. orally and withdrawal 5 days later at 25 mgm. level.

Response. An immediate quietening was produced. By the second day he was sleeping for long periods and his behaviour was no longer influenced by, and himself no longer distressed by, his hallucinations. On the eighth day he relapsed into a restless aggressive phase and was inadvertently given 7½ grs. Sodium Amytal intramuscularly—without however showing any greater sedative effect than a sound night's sleep. He awoke uneventfully the following morning and had regained his composure. He remained hallucinated throughout, but was able to disregard the experience, and was thus enabled to mix and converse socially with noticeably greater freedom. His somnolence decreased after the first week of the course, and as it did so, it became clear that he was more accessible than at any time previously in the writer's experience of him.

Treatment was discontinued because of the occurrence of a series of generalized convulsions (considered to be post-leucotomy phenomena). On withdrawal of the drug he relapsed promptly, becoming increasingly irritable and hostile and increasingly influenced and distressed by his hallucinatory "voices".

Opinion. A good symptomatic improvement (better in fact than that produced by any of his former treatments) with complete relapse on withdrawal of the drug.

(4) *J.H. Male, 42*

A feeble-minded schizophrenic of many years duration. Behaviour completely dominated by hallucinatory commands and insinuations of impending death. Periodically hostile and openly aggressive and at onset of treatment, subject to five or six noisy agitated outbursts per day. No sustained response to any acknowledged form of treatment (except leucotomy).

Treatment. Routine scheme of dosage with 3 days at 200 mgm. level.

Response. For the first two days he showed no change of any sort. On the third day he became noticeably quieter and more easily managed, co-operated with instead of resisting the nursing staff and lay supinely in bed. His hallucinations remained and he discussed them freely, but after the third day, no further noisy outbursts occurred during the course, and the domination of his hallucinations over his behaviour had obviously been lessened considerably.

On the withdrawal of the drug he promptly relapsed into his former state.

Opinion. A good example of the indifference to hallucination produced by the drug—again with relapse on withdrawal.

(5) *E.B. Male, 47*

A deteriorating schizophrenic of many years standing. Behaviour hostile and aggressive in response to ever-present auditory hallucination, necessitating considerable nursing supervision to prevent damage to himself or others.

Treatment. Routine scheme of dosage with 3 days at 200 mgm. level.

Response. Apart from a mild somnolence—no change of any sort was noticed.

Opinion. An example of the variability of the drug. Arguing from the former case, there should have been some symptomatic lessening of the effect exerted by his hallucinations on his behaviour. In point of fact, there was none.

(6) *P.O. Male, 24*

A detached, dreamy and apathetic schizophrenic of 6 years duration. Occasional paranoid outbursts against members of his family in response to aural hallucination. At onset of treatment, he was erratic and irresponsible in his behaviour in response to these hallucinations, and required much nursing supervision.

Treatment. Routine scheme of dosage with 3 days at 200 mgm. level and 8 days at 50 mgm. orally.

Response. His erratic behaviour ceased as the somnolent effect—particularly marked in this case—became established on the second day. Most of the following week he remained asleep in bed, but could be readily roused and was able to feed and care for himself. He remained hallucinated and showed no change in any respect, except that he now stayed supinely in bed whereas formerly he had done anything but this.

On withdrawal of the drug he maintained his improved behaviour—and required less supervision than formerly, but similar remissions have occurred in the past in the absence of the drug.

Opinion. An example of the purely somnolent effect of the drug—in spite of which he was able to care for himself in a manner that would not have been possible had a similar sedative effect been produced by barbiturates. The absence of any significant clouding of consciousness when awake was noticeable.

(7) *S.G. Male, 57*

Recurrent mania in a known cyclothymic personality of typically pyknic habitus. Elated, overactive and grandiose. Incessant press of good natured talk relating to his wealth and genius for invention. Symptoms present for 10 days prior to treatment.

Treatment. 150 mgm. I.M.I. on 1st day; 200 mgm. for seven succeeding days; replacement and reduction to 50 mgm. orally by the 13th day; maintained at this level for a further week.

Response. During the second day, his overactivity gave way to a lethargic soporose state and he lay quietly in his bed, at times elated and jocular, at others withdrawn and detached. He no longer retained his grandiose delusions and was reluctant to discuss the various inventions of which he had formerly been so proud. By the end of the first week this picture changed and he entered into a state of utter disinterestedness and detachment. His conversation was slow and laboured and punctuated by marked perseveration. His facial expression was one of dazed bewilderment and he appeared to experience difficulty in grasping what was said to him. He was, however, able to obey commands very much more readily that he was able to reply verbally to questioning. He mistook the identities of persons he knew well, and needed urging and supervision with his food and toilet. On the seventh day he became incontinent of urine and faeces for the first time in his history, and showed no concern over this. At this point a state of intoxication was considered to exist and withdrawal of the drug initiated (to 50 mgm. parenterally on the 10th day and 50 mgm. orally on the 13th day). By the time the oral administration was established his incontinence had subsided, his speech was fluent, he recognized members of the staff and co-operated with them, and exhibited no more than the usual degree of "indifference". A week later the drug was discontinued, his activities and mentation having returned to normal. His manic symptoms were no longer present and three weeks later he took his departure from hospital and returned home, retaining only the vaguest memory for the events of the intoxication period. He has remained well since.

Opinion. The symptomatic response was good though excessive. In view of his known cyclothymic temperament it is doubtful whether one can attribute the resulting "cure" entirely to chlorpromazine, although presumably one would have considered such a cure attributable to E.C.T. had E.C.T. been given him.

(8) *G.J. Female, 32*

Acute manic reaction, with elation, overactivity in all psychomotor spheres, well defined delusions of grandeur (wealth) and frank hostility and aggression at the slightest frustration. Onset 6 weeks prior to treatment. Two previous similar episodes in the past 3 years. No treatment prior to chlorpromazine.

Treatment. Routine scheme with 7 days at 200 mgm.; reduction to 100 mgm. orally on 17th day and withdrawal by the 21st.

Response. While on the 200 mgm. parenteral dose the response was altogether admirable. Not only did her elation and overactivity recede to negligible dimensions and her aggression give way to a pleasant and co-operative attitude, but she discussed the foolishness of her delusional beliefs and gave a very plausible explanation of their origin. On the eighth day she was transferred to oral dosage, having developed a troublesome inflammatory reaction to the injections, and from that day she progressively deteriorated into a state of chronic mania with a return of her former delusional ideas—which, with minor fluctuations, have persisted since.

Opinion. Yet another good symptomatic response, in this case not surviving transfer to oral administration. Noticeable for the absence of both "somnolence" and "indifference".

(9) *R.J.F. Male, 69*

Acute agitated melancholia of two or three weeks' duration. Much hypochondriacal preoccupation accompanied by an almost incessant moaning. Early arteriopathic cerebral deterioration. No previous relevant history. No treatment prior to chlorpromazine.

Treatment. Routine scheme with 4 days at 200 mgm. level: reduction to 50 mgm. oral level by 21st day: maintenance at this level for a further 2 weeks.

Response. The agitation, which was extreme, progressively subsided throughout the first week, his moaning occurring only in short nocturnal bouts after the third day. Although no sudden change occurred, the picture at the end of the first week was greatly improved. He was able to converse naturally, appreciate a joke and discuss himself and his former hypochondriacal fears rationally. Occasionally he was mildly agitated for short periods, but could now be quietened by verbal reassurance.

By the end of the second week his agitation had disappeared completely and he no longer spontaneously mentioned his former abdominal pains and malfunctionings. He described himself as no longer depressed and took an active part in ward activities—looking a younger man by some ten or fifteen years than the picture he had presented originally. At no time was the somnolent response marked and—possibly because of his loss of preoccupation with his hypochondriacal ruminations he gained rather than lost interest in his surroundings. This response was maintained until the day his maintenance dose was withdrawn, when he exhibited a noisy agitation during the night. This had cleared by the following morning, and he took his departure from hospital a few days later apparently a much improved man. Within a week however, he had been readmitted in a state identical to that present at the onset of treatment.

Opinion. A good symptomatic response, not maintained on withdrawal of the drug.

(10) *D.C. Female, 42*

Extreme restlessness, agitation and apprehension in a long-standing anxiety hysteric. At the time of treatment she was being nursed in a protected room to prevent self-injury during her restlessness. She was completely out of touch with reality and utterly uninhibited in her behaviour. Her conversation was illogical and obviously dominated by phantasy-formation of hallucinatory intensity. She claimed that her nocturnal screaming bouts resulted from labour pains and each morning insisted that she had given birth to a child during the night. She made repeated accusations of incest against her father and became acutely disturbed when visited by him. Repeated and dangerously heavy barbiturate sedation produced very little effect, and the possibility of her reaching an alarming state of exhaustion was ever-present. Acute symptoms had been present for 10 days prior to treatment.

Treatment. Routine scheme, with 6 days at 200 mgm. level followed by 26 days at 200 mgm. level orally and then prolonged maintenance, still continuing, at 50 mgm. daily.

Response. Her restlessness and screaming began to subside on the second day and were under control by the fourth, by which time she was accessible enough to discuss the origin of her sexual phantasies rationally and calmly. The improvement in her general behaviour was considerable, and although she remained very tense and tremulous she conducted herself well and was removed to a single room and thence to a ward by the end of the second week.

She described herself as able to ignore her unpleasant phantasies and from the third day gave no further evidence of hallucination. By the end of the first week she was lying quietly in bed to the great relief of all concerned with her nursing, and faced visits from her father with equanimity—recognizing her incest phantasies but now apparently indifferent to them. This state of affairs has been maintained to date (a matter of some 3 months) and although tremulous and anxious still, she presents a picture that can best be described as a divorce between her mind and the somatic aspects of her anxieties. The latter are of sufficient intensity to produce considerable distress in a normal individual. She, however, acknowledges their presence without experiencing any mental distress at their existence.

One has the very strong impression that any attempt to withdraw the drug will result in a complete relapse.

Opinion. A very impressive response initially—maintained to date, but with every indication of a relapse on withdrawal.

(11) *A.W. Male, 58*

A self-absorbed depressive, retarded in all psychomotor spheres and preoccupied with abdominal and thoracic hypochondriacal ruminations of delusional intensity. Symptoms present, with fluctuating intensity, for a year and a half. Previous similar episodes in 1935 and 1940.

Treatment. Routine scheme, with 5 days at 200 mgm.

Response. No response of any sort was observed apart from mild somnolence during the first week.

(12) *G.F. Female, 57*

Six months' history of increasing depression and anxiety following the death of her mother, is an egocentric hysterical personality, preoccupied with the somatic manifestations of her anxieties (mostly abdominal).

Treatment. Oral throughout, reaching 200 mgm. on 4th day and maintained there for 4 days: then 300 mgm. for 4 days with subsequent reduction and withdrawal by the 19th day.

Response. No clinical benefit of any sort was observed.

(13) *C.N. Male, 62*

A long-standing chronic anxiety-neurotic subject to periodic depressive reactions. Much preoccupied with hypochondriacal rumination resulting from misinterpretation of his somatic anxiety manifestations. Miserable and wretched at onset of treatment, with no interests or concern beyond his hypochondriasis. A picture of misery.

Treatment. Oral throughout, owing to his dislike of injection. Routine scheme with 5 days at 200 mgm.: 14 days at 150 mgm.: reduction to 25 mgm. on 26th day and cessation the following day.

Response. For the first week there was little response beyond a fairly marked somnolence. During the second week he became brighter, lost his hypochondriacal preoccupations and took an intelligent interest in ward activities and topical events. A week later he was smiling and conversing naturally, and grudgingly admitting to feeling better (he had stoutly denied that anything could relieve him of his wretchedness). His facial expression was less tense and his facial creases had been smoothed out—resulting in a more youthful appearance. He was allowed up and requested to be allowed to take up his former hospital occupation of gardening, which was granted. There was no evidence of depression, his muscular movements had gained mobility and grace and his hypochondriacal pains were in full abeyance. His basic anxieties remained, but their somatic manifestations gave him no concern. He has maintained this improvement for the past six months.

Opinion. A good response, well maintained. As in case 9—the loss of interest in his hypochondriacal ruminations produced a gain rather than a loss of external interests—thus producing a result apparently contrary to what has been described as the characteristic response of "indifference".

(14) *N.H. Female, 23*

An immature woman of hysterical personality subject to nocturnal panic storms during which she became apprehensive, tearful and very restless—believing herself about to die and relieving the accompanying tension by screaming. Tearful and depressed during the day. Symptoms since birth of first child 6 weeks previously. A difficult nursing problem on account of her restlessness.

Treatment. The routine scheme was initiated, but remained at 25 mgm. b.d. level because her refusal to stay in bed made the risk of postural hypotensive attacks too great. On the fifth day she was given 25 mgm. t.d.s. orally and on the following day 25 mgm. b.d. plus Sodium Amytal gr. 3 t.d.s. Two days later this was raised to 50 mgm. b.d. and then withdrawn.

Response. No clinical benefit of any sort was observed. It was felt unjustifiable to push the dosage up to the usual maximum in view of our inability to ensure that she remained in bed.

Opinion. An interesting result in that she was the only patient in this series whose disturbed behaviour failed to show some response to the drug. Even in the acutely disturbed schizophrenics, the question of ensuring that the patient remained in bed during the initial stages of treatment had presented no difficulties.

(15) *M.K. Female, 17*

Obsessional-compulsive neurosis in a maladjusted adolescent who had been receiving psychiatric treatment of one variety or another since the age of 7. In July of this year the question of a developing schizophrenic illness had been raised and she had received 40 Insulin Comas with little benefit—her personality structure revealing schizoid features at the onset of chlorpromazine treatment. Her compulsions were ritualistic in nature and severely handicapped normal every-day activity: her obsessional preoccupations revolved around the ever-recurring phantasy that she was destined to die by strangulation. She possessed clear insight into the abnormality of her condition and was distressed at it.

Treatment. Oral throughout, reaching 50 mgm. t.d.s. on 9th day and 50 mgm. 6-hourly on the 15th where it still remains.

Response. No response was observed during the first week. During the second week her compulsive rituals receded and she spontaneously mentioned her relative freedom from them. At the same time the distress which accompanied her obsessive preoccupation with strangulation lessened in severity and the frequency with which she was overwhelmed by her fears decreased from several times a day prior to treatment to only twice during the third week of the course. This state of affairs is still maintained (i.e. at the end of the fourth week).

Opinion. She has not been observed for sufficient time to warrant any conclusion being drawn. One can, however, say that a greater response has been obtained from chlorpromazine than from any other form of treatment she has received.

(16) *A.P. Male, 51*

A long-standing obsessional neurotic subject to periodic anxiety storms and depressive, self-depreciatory episodes (usually responding rapidly to E.C.T.). Socially inadequate, but able to maintain a tolerable existence in the hospital community. Compulsive dressing rituals and obsessive preoccupation with sexual and religious conflicts present at onset of treatment.

Treatment. Routine scheme, with 11 days at 200 mgm. level: 7 days at 150 mgm.: 9 days at 100 mgm. and withdrawal four days later.

Response. Well marked somnolence during the first week with a considerable increase in frequency and intensity of dreaming. During the second week, as his somnolence decreased, he stated that he felt "more confident", but this was probably spurious—particularly as his ritualistic activities tended if anything to increase.

As the course proceeded he became progressively more tense and miserable, acutely so on withdrawal of the drug, and was eventually given a short course of E.C.T. which restored the status quo.

Opinion. This was the only case in which an adverse effect could be attributed to the drug.

(17) *M.J. Female, 38*

Anxiety state with intolerable tension of seven months' duration in response to unaccepted aggression towards the persons involved in the break-up of her marriage. Thiopentone and CO_2 abreactive sessions had produced only temporary benefit and at the onset of treatment she was in a state of great tension, manifesting as agitation, paroxysmal weeping, screaming bouts and utter wretchedness.

Treatment. 25 mgm. I.M.I. on 1st day: 50 mgm. on 2nd. Treatment interrupted on third day because of gross inflammatory reaction at site of injection. Eight days later a routine scheme was initiated orally, the 200 mgm. level being maintained for 3 days and a maintenance 50 mgm. dose being established on the 10th day, and continued to date.

Response. By the second day of treatment she was greatly changed. Her tensions had largely subsided and she lay quietly in bed and discussed her affairs unemotionally, making mention of her inability to be provoked to tears. During the interim period while her thighs were being treated for the inflammatory reactions that developed, she became euphoric and elated, and then suddenly relapsed into her former state of wretchedness following the occurrence of a dream, the frank aggression of which terrified her. Even so, her former agitation and screaming did not appear. As the oral course became established, she regained her composure and exhibited a degree of indifference to her very real stresses that was very impressive, particularly as there was no clouding of consciousness and she still clearly remembered the causes of her previous distress.

This "indifference" made the nursing of her thighs simpler than it might have been. Although on her own admission painful—she showed no evidence of subjective distress. She exhibited a marked pallor and was one of the patients who experienced a postural blackout.

These responses in conjunction with the injection reaction and the considerable benefit she received from a modified course of treatment suggest that she may have presented the picture of a patient sensitive to chlorpromazine.

Opinion. One cannot accept this in any sense as a cure (particularly as she gives every indication of relapsing when the drug is withdrawn), but the symptomatic relief obtained has been great.

(18) *J.M. Male, 38*

A chronic depressive with a conditioned fear response to a ward clinic similar to that in which, in 1948, he had received a course of cardiazol-induced convulsive therapy. Attempts to persuade him to enter the room produced marked anxiety symptoms with sweating, tachycardia, dyspnoea and the passage of flatus. Similar response occurred on attempting to give him any injection, which, in fact, he adamantly refused to have. At the onset of treatment he was tense, agitated and apprehensive.

Treatment was undertaken solely to determine whether or not the fear-reaction could be "de-conditioned".

Treatment. 100 mgm. orally on 1st day: 150 mgm. orally on 2nd. Thereafter he accepted intramuscular injections without demur, a routine course being given him with 10 days at 200 mgm.: 7 days at 150 mgm. and withdrawal on the 22nd day.

Response. The response was most interesting. As already mentioned, by the third day he was accepting intramuscular injections without distress, his anxieties were markedly reduced and he lay quietly and contentedly in bed.

At the end of the first week of treatment he entered the room concerned without any fuss and showed no evidence of his former agitation and fear: and has maintained this attitude towards the room to date. He is however, now showing evidence of a returning fear of injection procedure.

Opinion. It is not possible to determine how much of this response was due to the chlorpromazine and how much to his realization that further cardiazol injections were not contemplated. Nevertheless, previous attempts to reassure him on this point had failed. It had been hoped to demonstrate similar responses in other cases, but so far, suitable patients have not been found.

CONCLUSION

The results of this preliminary survey indicate that chlorpromazine exerts a clinical action of use in the management and treatment of psychiatric in-patients. The response to the drug in the present series has varied, and no clear-cut indications for its use can be laid down as yet. It has, however, been shown to bring about a lessening of the disturbed behaviour in schizophrenic and manic excitements, and the ease with which such states can be brought under control has been impressive. It has also produced a lessening of disturbed behaviour in response to hallucinatory experiences, and a decrease in the distress produced by the somatic accompaniments of anxiety.

The method of administration is not yet established, and reactions to intramuscular injections have occurred with troublesome frequency. In spite of this, however, further investigation of the drug would appear to be well merited.

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THE SYMMETRY OF CONSTRUCTED PATTERNS

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INTRODUCTION

THE opinion is sometimes expressed that patterns constructed by socially maladjusted individuals (e.g. in woodcarving, needlework, arrangement of flowers, etc.) are less symmetrical than those of the adequately adjusted. It is even held that the amount of asymmetry bears some relationship to the degree of maladjustment. Evidently, other factors besides maladjustment are involved in this question. The primary aim of the inquiry reported here was to investigate the effects of differences in sex, intelligence and level of social adjustment on the symmetrical construction of patterns. The technique employed for this purpose was akin to that of the mosaic test of Lowenfeld (1949) but of a more delimited character and with simplified material.

It is well-known that the term "symmetry" denotes two distinct concepts, a rather indefinite aesthetic notion and a precise geometrical one, which has various applications in different sciences. The former corresponds to the first part of the definition in Fowler's *Concise Oxford Dictionary* (1934): "(beauty resulting from) right proportion between the parts of the body or any whole, balance, congruity, harmony, keeping." The latter corresponds to the second and third parts of the same definition. For the purpose of this inquiry the geometrical concept and the third part of the Concise Oxford definition were adopted: "repetition of exactly similar parts facing each other or a centre." It is probably true that many statements about symmetry in the patterns of the socially maladjusted relate to the aesthetic concept but this notion is so subjective and so insusceptible of accurate treatment that a strict adherence to the geometrical concept seemed likely to be much more fruitful.

MATERIAL AND INSTRUCTIONS

The material to be arranged in patterns comprised pieces of cardboard cut into three shapes and painted with poster paint of three colours. The shapes were circles of radius 1 cm., equilateral triangles of side 2·5 cm., and squares of side 1·8 cm. It was necessary to make the triangles substantially smaller in area than the circles and squares if they were not to be perceived as markedly larger. The poster paints were Winsor & Newton's poster red, poster green and lamp black. There were twelve pieces of each shape; four were painted red, four green and four black. Systematic selections from this stock were presented to the subjects, for construction into patterns, in a constant order as follows:

Item	Description	No. of Pieces
I	All greens	12
II	All circles	12
III	All triangles	12
IV	All reds	12
V	All squares	12
VI	All blacks	12
VII	All greens and reds	24
VIII	All circles and triangles	24
IX	All reds and blacks	24
X	All circles and squares	24
XI	All triangles and squares	24
XII	All greens and blacks	24
XIII	All pieces	36

The subjects were required to construct their patterns on a square of stiff white paper having a green border 1 cm. thick painted with Winsor & Newton's poster green. The white square contained by the border had a side of 20 cm. The pieces for each item were presented to the subjects in segregated heaps of each kind, e.g. for item I: green circles, green triangles and green squares. The standard instructions were: "I am going to give you some of these coloured pieces and I want you to make them into a pattern in this frame. You know what a pattern is, don't you? Don't try to make a picture with them, make a pattern. Use all the pieces given to you. Don't place any piece on top of another piece but place the pieces so that they touch. You must be able to go from any one piece to any other without jumping over a space." If the subject did not know what is meant by "pattern", the administrator secured his understanding by pointing to various patterned objects in the room, e.g. clothing, upholstery, etc. No time-limits were imposed and no subject was hastened in any way. A separate record-sheet was kept for each subject. The pattern that he produced for each item was recorded as soon as he had completed it. This was carried out by means of simple conventions which made it possible for the same pattern to be set up again whenever necessary and for the symmetry of all patterns to be systematically analysed and marked at a later convenient time.

SUBJECTS

All subjects were in-patients of Netherne Hospital. In the primary comparison (effects of sex, intelligence and social adjustment) it was decided to consider two levels of intelligence and two of social adjustment. The former were defined in terms of score on the Wechsler-Bellevue vocabulary: *bright*, having a score of 32 or more, and *dull*, having a score from 18 to 25 inclusive. The latter were defined in terms of likelihood of discharge to the outside community; *convalescent*, recent patients who had completed their treatment and were awaiting discharge in a convalescent villa, and *parole*, well-behaved chronic patients on parole, who had been in hospital at least three years and were very unlikely to be discharged in the near future. It was thought convenient to have ten subjects for each possible combination of sex, intelligence-level and adjustment-level, i.e. eighty subjects in all. Convalescent and parole patients of each sex were obtained from the charge-nurses or sisters of appropriate wards and tested with the Wechsler-Bellevue vocabulary. Those of the defined intelligence-levels were asked to construct patterns. This procedure was continued until each category had the requisite number of cases. In order to determine consistency of performance the parole patients and the first ten available convalescent patients were asked to construct patterns on a second occasion after an interval of approximately two months (mean interval 59·4 days, S.D. 10·7, range 35-86).

It seemed of value to extend the inquiry to patients showing a more outspoken pathology of behaviour and it was decided to sample the following classes: (*a*) oligophrenics, (*b*) senile dements, (*c*) cases of determinable organic brain-disease, (*d*) chronic patients showing marked habit-deterioration and under continuous supervision. Again it was thought convenient to have ten male and ten female patients of each class. These were obtained, as in the previous instance, from the charge-nurses or sisters of appropriate wards until the requisite numbers were secured in each category. For the first three classes the neuro-psychiatric diagnoses in the case-histories were accepted as authoritative. The cases of determinable organic brain-disease were:

	Males	Females
Dementia Paralytica	6	2
Huntington's Chorea	—	4
Cerebral Atrophy	3	4
Cerebral Carcinoma (Secondary)	1	—

The distributions of the various categories of subjects as to age and Wechsler-Bellevue vocabulary-score are shown in Table I. The vocabulary responses of the habit-deteriorated patients could not be satisfactorily scored. None of the mean differences between male and female patients of the same category is statistically significant except that for age in the habit-deteriorated class (t=3·469, 18 d.f.). Four patients refused to construct patterns (two male senile dements and two female habit-deteriorated chronics) and others were substituted for these. The Ishihara test indicated that two patients were colour-blind (a male bright convalescent and a male organic) but, as both were able to sort out the 36 pieces according to colour without a single error, they were not excluded from the inquiry.

TABLE I

Distributions of Ages and Vocabulary-Scores

	Ages			Vocabulary-Scores		
Categories	Mean	S.D.	Range	Mean	S.D.	Range
Less Pathological						
Male Bright Convalescent ..	39·7	11·8	20–59	35·2	2·4	32–41
Female Bright Convalescent	35·4	11·8	21–58	35·0	2·7	32–40
Male Dull Convalescent ..	38·9	12·5	16–53	22·1	2·3	19–25
Female Dull Convalescent ..	30·8	7·6	20–43	21·1	1·9	18–24
Male Bright Parole	41·7	12·1	20–62	34·2	2·4	32–38
Female Bright Parole ..	48·8	10·8	25–63	34·7	2·1	32–38
Male Dull Parole	43·9	14·7	22–61	21·8	1·8	18–24
Female Dull Parole	44·0	9·2	21–53	21·5	1·8	19–24
More Pathological						
Male Oligophrenic	38·8	7·4	28–54	11·1	3·9	5–16
Female Oligophrenic ..	45·2	13·5	24–61	12·2	3·7	7–17
Male Senile Dement ..	76·1	5·4	67–84	19·2	10·3	0–37
Female Senile Dement ..	75·3	6·1	63–86	15·0	10·6	4–32
Male Determinable Organic	46·7	11·3	27–65	22·8	7·6	6–38
Female Determinable Organic	53·2	9·7	34–64	19·0	7·8	1–32
Male Habit-Deteriorated ..	39·7	9·1	30–58	—	—	—
Female Habit-Deteriorated ..	53·3	7·5	40–67	—	—	—

QUANTIFICATION

It was observed that six broad levels of performance in regard to symmetry could be distinguished in the patterns:

(1) There was perfect symmetry about both the vertical and the horizontal axes and, in addition, (*a*) the pattern remained unchanged when rotated through an angle of 90 degrees in its own plane and (*b*) the four quadrants derived from bisection along each of the two oblique axes were identically interchangeable (*entire symmetry*, e.g. Fig. 1, A);

(2) There was perfect symmetry about the vertical and horizontal axes but neither of the preceding added conditions was satisfied (*double symmetry*, e.g. Fig. 1, B);

(3) There was perfect symmetry about one axis, vertical, oblique or horizontal (*single symmetry*, e.g. Fig. 1, C);

(4) The pattern was for the most part symmetrical but a very few pieces were not symmetrically placed (*imperfect symmetry*, e.g. Fig. 1, D);

(5) A few pieces were symmetrically placed but most were asymmetrical (*rudiments of symmetry*, e.g. Fig. 1, E);

(6) There was no vestige of symmetrical placement in the pattern (*absolute asymmetry*, e.g. Fig. 1, F).

There were also several complicating phenomena which are discussed below. The most important of these was *balanced reversal:* one side of an axis was inversely symmetrical with the other, i.e. the pattern would be symmetrical about a particular axis if one side were rotated through 180 degrees in the plane perpendicular both to the axis and to the plane of the pattern (e.g. Fig. 3, C). Balanced reversal had to be rather carefully distinguished from another type of reversal, *duplication* (e.g. Fig. 2, C), since it arose under quite different circumstances. In duplication, symmetry about a particular axis would derive from rotation of one side through 180 degrees either in the plane of the pattern or in the plane perpendicular to that of the pattern but parallel to the axis. Rotations making balanced reversal symmetrical do not have this effect on duplication and vice versa, as may be readily confirmed in Figs. 2, C, and 3, C.

Many scientists have followed Mach (1906) in identifying *vertical, horizontal* and *centric* as the fundamental categories of symmetry. In constructed patterns, however, two or three distinct possibilities could be regarded as showing centric symmetry. A more convenient quantification is attained if axial symmetry, capability of rotation without change and reversal are taken as the basic elements. It was decided to score symmetry of shape and symmetry of colour separately and to apply the following additive system of marking:

(*a*) 2 marks for perfect symmetry about the vertical axis, 1 mark for imperfect symmetry about the vertical axis;

(*b*) 2 marks for perfect symmetry about the horizontal axis, 1 mark for imperfect symmetry about the horizontal axis;

(*c*) $\frac{1}{2}$ mark to a whole pattern showing rudiments of symmetry;

(*d*) 1 additional mark to a pattern that was entire;

(*e*) $\frac{1}{2}$ mark, in addition to the mark under (*a*), for balanced reversal about the vertical axis;

(*f*) $\frac{1}{2}$ mark, in addition to the mark under (*b*), for balanced reversal about the horizontal axis.

Balanced reversal was given a greater weight than direct symmetry because its production seemed to be a more complex behaviour. A subject's score for each item was the sum of his marks under each letter. The maximum score was 5 per item, 65 for the whole series.

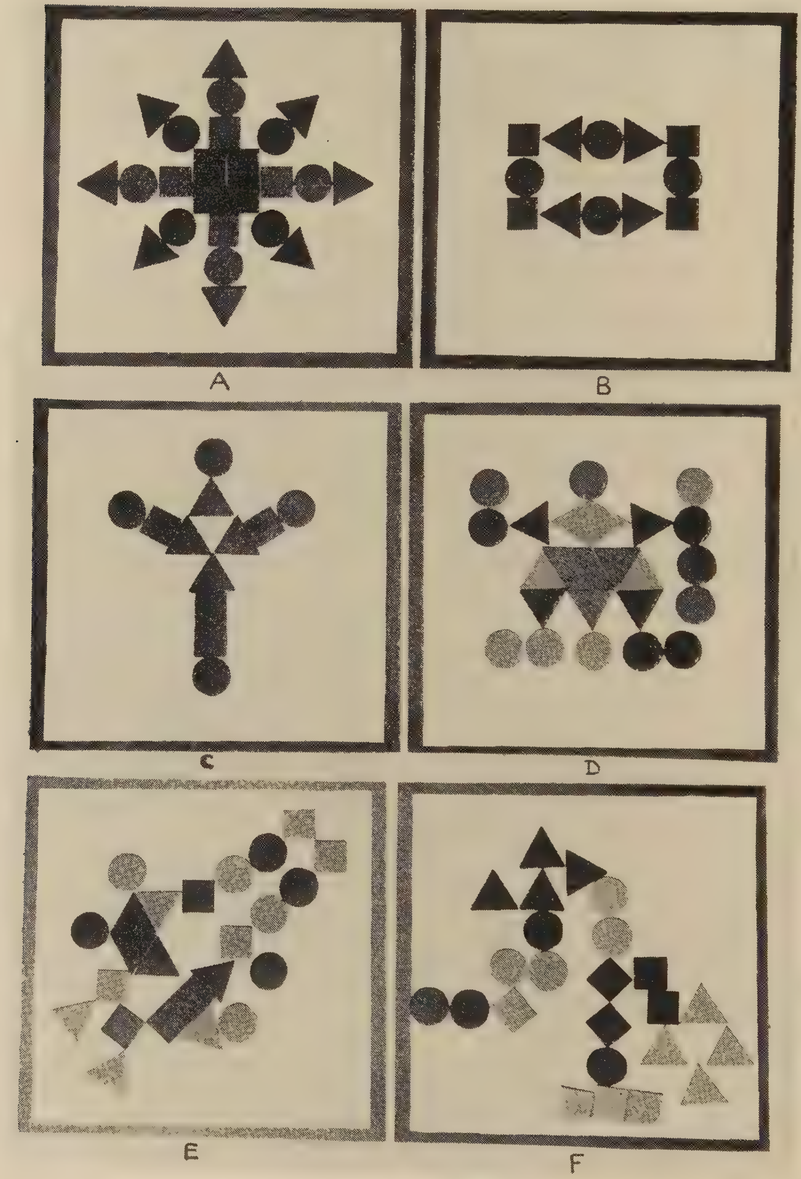

FIG. 1.—Levels of Symmetry.

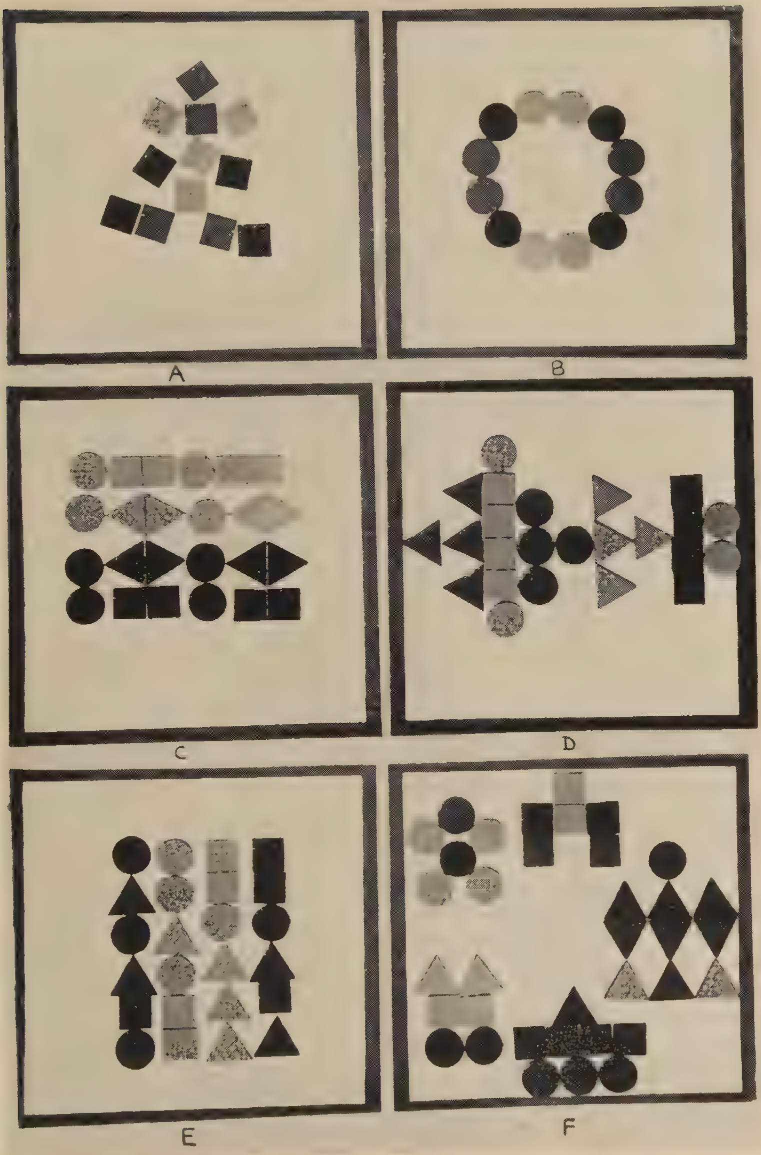

FIG. 2.—Special Behaviours.

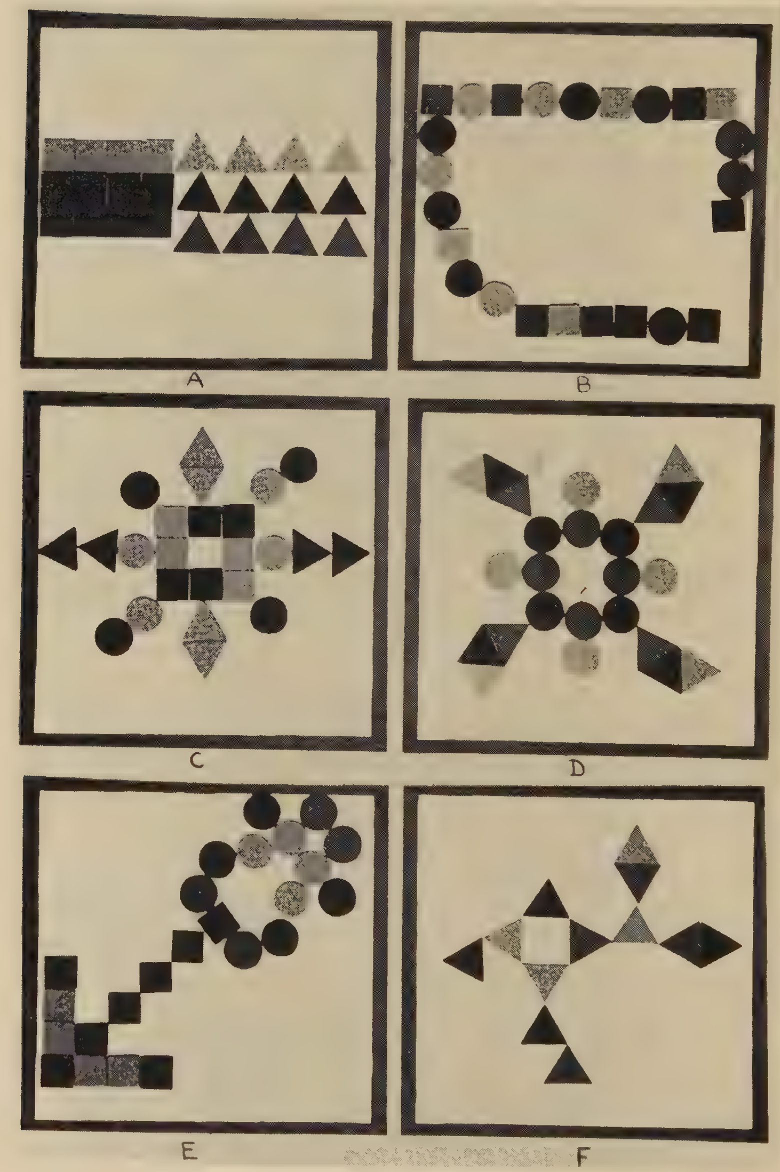

FIG. 3.—Special Behaviours (*continued*).

Certain details about the scoring require elucidation. The distinction between imperfect symmetry and rudiments of symmetry was necessarily fixed at an arbitrary point. Patterns with defective symmetry about a particular axis were considered to be at the level of imperfect symmetry if at least five-sixths of the pieces were symmetrically placed. Otherwise they were considered to be at the level of rudiments of symmetry. Therefore, a pattern received a score for imperfect symmetry if it had 1-2 asymmetrical pieces in items I-VI, 1-4 such pieces in items VII-XII or 1-6 such pieces in item XIII. Patterns showing *oblique symmetry* (e.g. Fig. 3, E) were scored as if they were vertical or horizontal patterns rotated through 45 degrees. Duplication about an axis was credited neither as perfect symmetry nor as reversal. In *semi-entire symmetry* (e.g. Fig. 3, D), where the pattern remains unchanged when rotated through an angle of 90 degrees but the four quadrants derived from double oblique bisection are not identically interchangeable unless one side of the pattern is reversed, two ½-mark credits were given under (*e*) and (*f*) but no mark was given under (*d*).

The scoring system appeared to be an adequate method of quantifying the facts of symmetry in this situation and was successfully applied to all the patterns obtained. Although the system is entirely objective there is some liability to inaccuracy through neglecting aspects of a pattern; therefore, all marks were checked by a second independent scorer. One or two initial problems were soon overcome. The most obstinate of these was to decide what positional relations constituted *pure symmetry of colour* (e.g. Fig. 2, E). Such relations evidently could not be determined in the straightforward spatial manner applicable to pure symmetry of shape or joint symmetry of shape and colour. The most convenient method of dealing with the problem was to regard triangles and squares as replaced by circles of the same colour. The obtained pattern was scored as symmetrical for colour to the same extent that the substituted one was for shape and colour. A second problem was that some patterns were conceived as symmetrical but in fact placed very carelessly so that spatially they did not satisfy the definition (*careless placement*, e.g. Fig. 2, A). These were scored as if the actual placement were no less symmetrical than its conception. Still another problem was that the higher levels of symmetry could be attained in a rather complex way or very simply by *circular* or *linear placement* of pieces (e.g. Fig. 2, B). It was debated whether to score symmetry achieved by very simple placement at a lower level than the more complex forms. It was decided, however, to hold to a strictly geometrical concept of symmetry and to mark such patterns accordingly, even in extreme cases of linear placement where the symmetrical parts round an axis were half-pieces only. These difficult cases were infrequent and sporadically distributed for the most part, so that the results were not greatly modified by them.

The foregoing may be exemplified by citing the marks given to the patterns reproduced in the figures. The score for shape-symmetry is quoted first and that for colour-symmetry after it in brackets (in the figures the lightest shading represents green, the darkest black, the intermediate red):

	A	B	C	D	E	F
Figure 1 ..	5 (5)	4 (4)	2 (2)	1 (½)	½ (½)	0 (0)
Figure 2 ..	2 (2)	5 (4)	3 (1)	2 (2)	0 (4)	½ (½)
Figure 3 ..	0 (2)	½ (0)	5 (5)	5 (5)	2 (2)	½ (0)

Reliability of Scores

The eighty less pathological and the eighty more pathological subjects were taken separately in calculating split-half (odd-even) product-moment correlations for the shape-scores and colour-scores. Item XIII was ignored in these correlations; the half-total scores were divided by three and rounded to the nearest integer for convenience in computation. The obtained correlations were corrected in the customary way by the Spearman-Brown prophecy-formula. The split-half correlation for shape-symmetry was ·954 in the less pathological and ·970 in the more pathological patients. The split-half correlation for colour-symmetry was ·837 in the less pathological and ·930 in the more pathological patients. The difference between the latter correlations is statistically very significant when tested by the z-distribution of Fisher (1950); the ratio of the z-difference to the standard error is 2·82. The explanation of this difference is discussed below. The patterns of the fifty less pathological subjects to whom the series was re-administered after two months were available for test-retest (repetition) correlations. Here and in all subsequent statistical examinations (except those involving ranks) the total symmetry-scores were divided by five and rounded to the nearest integer. The test-retest correlation for shape-symmetry was ·951, for colour-symmetry ·858. Such correlations are hardly likely to be lower in a normally adjusted population. It is reasonable to conclude that the degree of symmetry shown by an individual in the construction of patterns is a highly consistent behaviour on a particular occasion and a highly stable one over a moderate lapse of time.

Relationship Between Shape-Scores and Colour-Scores

The product-moment correlation between shape-scores and colour-scores (uncorrected for attenuation) was ·718 in the less pathological and ·890 in the more pathological subjects. The difference between the correlations is statistically very significant when tested by the z-distribution (ratio of z-difference to standard error 3·19). The interpretation of this is discussed at a later point. There was a predominating tendency for colour-scores to be lower than shape-scores. This is most clearly indicated in terms of the ratio of the former to the latter (*colour-shape ratio*). In the total sample of 160 patients 24 had a colour-shape ratio of ·40 or below, 37 of ·60 to ·41, 65 of ·80 to ·61, 27 of 1·0 to ·81, and 7 above 1. Individual differences in the colour-shape ratio are discussed below.

Effects of Sex, Intelligence-level and Adjustment-level

The mean total uncoded scores for all categories of subjects in both shape-symmetry and colour-symmetry are set out in Table II. The effects on shape-scores and colour-scores of sex, intelligence-level and adjustment-level in the less pathological subjects are indicated by the analyses of variance in Table III, which also contains the analysis of covariance allowing for the regression of colour on shape. The effects of sex and adjustment-level are not statistically significant: that of intelligence-level on both shape-scores and colour-scores is highly significant. The ratio-test for homogeneity of variance (Snedecor, 1946) indicates that the effect of intelligence-level is not on dispersions but on means only; the F-ratio for shape is 1·347, for colour 1·014, 39 by 39 d.f. The effect of intelligence-level on colour-scores still remains highly significant when allowance is made for the functional dependence of colour-symmetry on shape-symmetry. This is fairly decisive evidence that the major factor determining the level of symmetry at which patterns are constructed is the intelligence of the individual making them. In so far as level of colour-symmetry is independent of level of shape-symmetry it is also determined in the main by the intelligence of the constructing individual.

TABLE II

Mean Symmetry-Scores (*Uncoded Total Scores*)

Categories	Shape-Symmetry		Colour-Symmetry	
	Male	Female	Male	Female
Less Pathological				
Bright Convalescent	47·1	46·0	38·2	39·4
Dull Convalescent	41·6	32·6	29·5	24·4
Bright Parole	50·4	39·7	42·9	34·8
Dull Parole	27·6	29·8	19·0	20·4
More Pathological				
Oligophrenic	29·6	12·7	23·8	7·8
Senile Dement	19·3	16·5	13·0	14·7
Determinable Organic	30·8	13·7	19·8	6·2
Habit-Deteriorated	13·4	4·7	11·1	4·2

TABLE III

Analyses of Variance and Covariance: Less Pathological Subjects (*Coded Scores*)

Factors	d.f.	Analyses of Variance		Analysis of Covariance: Colour on Shape	
		Shape-Score Mean Squares	Colour-Score Mean Squares	Cross-Product Sums	Errors of Estimate Mean Squares
Sex (S)	1	16·20	2·81	6·74	0·25
Intelligence (I)	1	96·80*	137·81*	115·50	63·73*
Adjustment (A)	1	11·25	5·51	2·87	4·79
S-I Interaction	1	0·45	0·62	0·53	0·35
S-A Interaction	1	0·20	0·32	4·76	−2·49
I-A Interaction	1	7·20	9·12	13·10	1·81
Triple Interaction	1	14·45	7·80	—	—
Error	72	5·67	6·57	—	—
Pooled Error	73	5·77	6·68	122·90	6·09

The probable distributions of populations may be inferred from the means in Table II by Snedecor's method. The 95 per cent. fiducial semi-interval is 3·4 for shape and 3·6 for colour; the 99 per cent. semi-interval is 4·5 for shape and 4·8 for colour. The male and female bright convalescent and male bright parole appear to belong to one population; the male dull convalescent and female bright parole to a second; the male dull parole and female dull convalescent and parole to a third. The anomalous position of the male dull convalescent and female bright parole is noteworthy. It might be taken to suggest that the effects of intelligence, although of predominant importance, can to some extent be offset by favourable or unfavourable combinations of sex and adjustment. Male sex with convalescent adjustment would then be a favourable combination raising scores above the expectation according to intelligence and female sex with parole adjustment an unfavourable combination lowering scores beneath expectation. This suggestion acquires some plausibility in the sequel, at any rate in regard to sex.

* Statistically significant beyond 1 per cent. level.

EFFECTS OF SEVERE BEHAVIOURAL PATHOLOGY

In dealing with the more pathological categories of subjects it was thought appropriate to include in the comparison only the dull convalescent and parole patients as a standard of reference. The effects on shape-scores and colour-scores of sex and pathological class are indicated by the analyses in Table IV.

TABLE IV

Analyses of Variance and Covariance:
More Pathological Subjects Plus Dull Convalescent and Parole (*Coded Scores*)

		Analyses of Variance		Analysis of Covariance: Colour on Shape	
Factors	d.f.	Shape-Score Mean Squares	Colour-Score Mean Squares	Cross-Product Sums	Errors of Estimate Mean Squares
Sex	1	73·67†	33·07*	49·35	0·58
Pathological Class ..	5	51·96†	22·49†	172·65	−0·05
Interaction	5	7·93	9·30	36·90	2·75
Error	108	6·24	4·82	514·00	1·20

Differences in sex and pathological class have each statistically significant effects on shape-symmetry and colour-symmetry. When allowance is made, however, for the regression of colour-symmetry on shape-symmetry the significance of the effects on colour disappears. The ratio-test for homogeneity of variance in the case of sex (F-ratio for shape 1·059, for colour 1·170, 59 by 59 d.f.) indicates that the effect of sex-difference is not on dispersions but on means only. Consideration of the means in Table II shows that in five of the six comparisons for shape and in four of those for colour the female mean is below the male, usually very substantially so. The evidence suggests that, within the limits set by intelligence, female sex is a factor tending to lower the level of symmetry at which patterns are constructed. The effect is inhibited by a favourable combination of intelligence and adjustment and accentuated by more severe pathology. The interpretation of this finding is discussed later.

The effects of pathological class occasion more difficulty than those of sex. Bartlett's test for homogeneity of variance (Snedecor, 1946) indicates that the samples differ significantly in this regard (chi-squared for shape 13·60, for colour 27·08, 5 d.f.) so that the effects may operate either on dispersions alone or on dispersions and means. The differences in variance (the dull parole and habit-deteriorated samples were considerably less dispersed than the other four) arose no doubt partly from unusual sampling chances and partly from the over-wide neuro-psychiatric classifications employed. There was no clear evidence that means were proportional either to ranges or to ranges squared so that neither logarithmic nor square-root transformations seemed definitely appropriate, cf. Kempthorne (1952). In the circumstances it appeared best to use a distribution-free statistic and to compare the classes separately within each sex. The U-test of Mann and Whitney (1947) was employed, taking U as having mean 50 and S.D. 13·23; with equal groups this test is equivalent to Wilcoxon's T-test. Samples were taken as probably belonging to different populations if U exceeded 76·45 or were less than 23·55. With minor irregularities this procedure indicated distinctions of populations closely similar to those suggested by the means in

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* Statistically significant at 1 per cent. level.
† Statistically significant beyond 1 per cent. level.

Table II. In the males the samples belonged to three populations: (1) dull convalescent; (2) dull parole, oligophrenics and organics; (3) senile dements and habit-deteriorated. In the females the samples also belonged to three populations: (1) dull convalescent and parole; (2) oligophrenics, senile dements and organics; (3) habit-deteriorated.

Provided some major anomalies are overlooked these data suggest that: (*a*) oligophrenics construct patterns at a lower level of symmetry than dull subjects, as would be expected if intelligence is the chief factor in symmetry-level; (*b*) determinable organic brain-disease of the types included in this sample reduces the level of symmetry at which patterns are constructed to that of oligophrenics; (*c*) senile dementia and the undetermined pathology leading to the behavioural status of the patients here described as habit-deteriorated reduce the level of symmetry in patterns below that of oligophrenics. There are four major anomalies: the positions of the male dull convalescent, the male oligophrenics, the male organics and the female senile dements. The relatively high scores of the male dull convalescent were discussed in the last section and provisionally attributed to the favourable combination of sex and adjustment-level; the difference from the male dull parole might, however, be merely a sampling error. The question of the male oligophrenics is of some theoretical importance and is considered in the next paragraph. The high mean scores of the male organics arose from four cases of dementia paralytica in whom therapy had arrested the disease at a fairly early point. The female senile dements evidently derived from two sharply divergent populations, since three had symmetry-scores in the range 38-54 and the remaining seven in the range 0-8; probably the first three were not true senile dements but belonged to some other class of elderly patients, cf. Roth and Hopkins (1953). Further sampling with more stringent definitions of neuro-psychiatric categories would establish how far these anomalies constitute objections to the suggestions made in the previous paragraph.

The male oligophrenics present a more far-reaching problem. Four of these had scores for shape-symmetry of 61, 56, 51 and 40 respectively. The remainder had scores in the range 9-26. The cases of the first two (scores 61 and 56), who ranked 4th equal and 10th equal in the total male sample, were regarded as crucial and considered in detail. Their high scores were attained by patterns of some complexity, not by simple procedures such as circular or linear placement. The most obvious explanation was that they were misclassified as oligophrenics but this could not be sustained. One had been tested four years previously with the Terman-Merrill Scale (L Version) and scored an I.Q. of 52; he was retested with the M Version and scored an I.Q. of 53. The other was tested for the first time with the L Version and scored an I.Q. of 52. The Terman-Merrill performance of each was self-consistent and unscattered; the responses of each showed marked defect in memory, judgment and reasoning. Moreover, the entire life-history of each before and after admission to hospital was in accord with a diagnosis of oligophrenia and with nothing else. It is possible that their oligophrenia was not genetically determined but arose from the pervasive effects of severe linguistic disability; no data of any sort were found that would substantiate this. The evidence already adduced that intelligence is the chief determinant of the symmetry-level at which patterns are constructed is too strong to be rebutted by these exceptional cases. The formulation most closely corresponding to the facts would appear to be the following: the procedures necessary to achieve a high level of symmetry in patterns are much more likely to be followed by persons of high than those of low ability but it is quite possible for persons of very low ability indeed to follow them. The distinguishing features of oligophrenics that attain a high symmetry-level constitute a problem for another investigation. It is noteworthy that all who did so here were males. It is also of interest that Diamond and Schmale (1944) found that in the mosaic test some oligophrenics did better and were more ingenious than their normal subjects.

DISTRIBUTION OF SYMMETRY-LEVELS

The facts just considered in terms of total symmetry-scores for shape and colour are presented in another form in Table V, showing the mean numbers of items at a given symmetry-level in each category of subjects. In calculating these quantities an item was credited with its highest symmetry-level in either shape or colour and along either the vertical, the horizontal or an oblique axis. The complication of reversal was ignored. The mean total in each category is of course 13. The significance of differences between the sexes and amongst the pathological categories at each level was tested primarily by analyses of variance but, if the hypothesis of homogeneity of variance had to be rejected, by Mann-Whitney U-tests. The trends suggested by the means were borne out with minor irregularities.

TABLE V

Mean Numbers of Items at Given Levels

	Symmetry					
Categories	Entire	Double	Single	Im-perfect	Rudi-ments	Absent
Less Pathological						
Male Bright Convalescent ..	5·5	3·4	3·0	0·3	0·3	0·5
Female Bright Convalescent	4·1	4·5	3·2	0·5	0·4	0·3
Male Dull Convalescent ..	2·9	5·4	2·4	0·9	0·2	1·2
Female Dull Convalescent ..	2·2	3·1	3·3	0·9	1·9	1·6
Male Bright Parole	4·2	6·5	2·2	0·1	0·0	0·0
Female Bright Parole ..	3·5	2·9	4·8	0·8	0·9	0·1
Male Dull Parole	0·5	2·7	5·5	2·2	1·7	0·4
Female Dull Parole	1·1	2·1	5·3	2·5	1·6	0·4
More Pathological						
Male Oligophrenic	2·0	4·0	1·3	1·4	3·9	0·4
Female Oligophrenic ..	0·2	1·2	1·4	0·9	6·9	2·4
Male Senile Dements ..	0·1	1·8	3·4	2·3	2·3	3·1
Female Senile Dements ..	1·3	1·1	0·8	0·9	3·4	5·5
Male Determinable Organic	1·9	2·1	4·2	1·2	2·5	1·1
Female Determinable Organic	0·4	1·2	2·7	1·2	0·9	6·6
Male Habit-Deteriorated ..	0·0	1·5	2·8	0·8	4·2	3·7
Female Habit-Deteriorated ..	0·0	0·8	0·4	0·3	2·7	8·8

There were very significant sex-differences in regard to double symmetry, which was commoner in males, and absolute asymmetry, which was commoner in females. Entire symmetry inclined to be commoner in males but the difference did not reach statistical significance. These trends point in other terms to the conclusion that female sex is a factor tending to lower the symmetry-level at which patterns are constructed. In the less pathological males and females the lower symmetry-levels were uncommon and most patterns involved entire, double or single symmetry. Only in the dull parole did the defective forms of symmetry play a part of any consequence. Among the males the modal performance was entire symmetry in the bright convalescent, double symmetry in the bright parole and dull convalescent, single symmetry in the dull parole. Among the females the modal performance was double symmetry in the bright convalescent and single symmetry in the other three categories, most markedly in the dull parole. Entire symmetry showed a steady fall in both sexes from bright convalescent through bright parole and dull convalescent to dull parole. These facts underline the importance of intelligence as a determinant of symmetry-level. In the more pathological categories the lower levels of symmetry predominated except in the male oligophrenics and organics. The male oligophrenics displayed two modes, one at double symmetry and one at rudiments of symmetry, suggestive of two populations. The male senile dements and organics were each scattered with modes at single symmetry but the seniles had a second near-mode at absolute asymmetry. The male habit-deteriorated had rudiments of symmetry as their modal performance. The female oligophrenics also had their mode at rudiments of symmetry, the other female categories at absolute asymmetry. While not reflecting all details of the conclusions suggested by the total symmetry-scores these findings corroborate them in indicating that oligophrenics usually perform at a lower level of symmetry than dull subjects and that severe behavioural pathology tends to reduce the symmetry-level of patterns to that of oligophrenics or below it.

TABLE VI

Frequencies of Special Behaviours

	Occurrence in Total Sample and its Divisions					Occurrence in Divisions of Less Pathological Sample				Excess Occurrence (over 3)
Behaviours	Tot.	L.P.	M.P.	M.	F.	B.	D.	Conv.	Par.	
A. *Unrelated to Pathology*										
1. Careless placement	34	14	20	14	20	5	9	9	5	0
2. Overstepping frame	7	4	3	4	3	1	3	0	4	0
3. Placing frame diagonally	12	8	4	6	6	3	5	0	8†	0
4. Circular placement	37	22	15	17	20	8	14	15	7	4
5. Duplication	14	9	5	8	6	2	7	4	5	1
6. Pure horizontal	11	6	5	8	3	1	5	3	3	3
7. Pure colour	12	5	7	4	8	1	4	3	2	1
8. C-S Ratio above 1	7	2	5	3	4	2	0	1	1	—
9. C-S Ratio ·4 or less	24	10	14	12	12	2	8*	7	3	—
B. *Characteristic of L.P.*										
1. Balanced reversal	38	36†	2	20	18	24*	12	23*	13	8
2. Semi-entire	15	14†	1	4	11*	9	5	9	5	1
3. Oblique	26	23†	3	10	16	11	12	15	8	0
4. Aesthetic asymmetry	7	7†	0	1	6	5	2	4	3	3
C. *Characteristic of M.P.*										
1. Fragmentation	27	8	19*	12	15	1	7*	4	4	7
2. Segregation	29	8	21†	17	12	3	5	5	3	16
3. Linear placement	18	5	13*	4	14†	0	5	2	3	8
4. C-S Ratio above ·8	34	6	28†	13	21	6*	0	2	4	—
Total number in sample	160	80	80	80	80	40	40	40	40	160

Abbreviations: Tot.=total sample; L.P.=less pathological sample; M.P.=more pathological sample; M.=male; F.=female; B.=bright; D.=dull; Conv.=convalescent; Par.=parole; C-S=colour-shape.

* Difference in frequencies statistically significant beyond 5 per cent. point.

† Difference in frequencies statistically significant beyond 1 per cent. point.

SPECIAL BEHAVIOURS

In the construction of the patterns a number of special behaviours occurred the frequencies of which it seemed desirable to count in addition to scoring for symmetry-levels. Several of these have already been defined and exemplified. The complete list is set out in Table VI. The table presents the number of subjects exhibiting each behaviour in the total sample; the less versus the more pathological and male versus female within the total sample; bright versus dull and convalescent versus parole within the less pathological subjects. The significance of differences was tested by chi-squared (with Yate's correction) if all expected frequencies were above 5, otherwise by the exact binomial-product method (Fisher, 1950). These behaviours occurred sporadically for the most part but certain subjects displayed some of them as a characteristic, or even a preferred, reaction. The extent of this for each behaviour is shown in the last column of Table VI, where it is arbitrarily taken that a subject exhibited excess occurrence of a behaviour if he displayed it in more than three items.

The special behaviours are arranged in three broad classes: those unrelated to degree of pathology, those characteristic of the less and those characteristic of the more pathological. In the first group, *careless placement* (Fig. 2, A), *circular placement* (Fig. 2, B), *duplication* (Fig. 2, C) and the *colour-shape ratio* have already been described. *Pure horizontal symmetry* (Fig. 2, D) and *pure colour-symmetry* (Fig. 2, E), are self-explanatory. In *overstepping the frame* the pattern finally offered by the subject extended over the green border; Fig. 3, E, would be an example of this if it were constructed along the vertical or horizontal axes. In *placing the frame diagonally* the subject rotated the square frame to the diagonal or "diamond" position and then constructed the pattern so that what was oblique in relation to the standard position of the frame was vertical or horizontal in relation to the constructing subject and *vice versa*. This is perhaps connected with the rotation phenomenon discovered by Shapiro (1951, 1952, 1953). In the second group *balanced reversal* (Fig. 3, C), *semi-entire symmetry* (Fig. 3, D) and *oblique symmetry* (Fig. 3, E) have already been described. *Aesthetic asymmetry* (Fig. 3, F) was the term applied to instances where the subject constructed the pattern according to a careful non-symmetrical plan. This was the only special behaviour whose occurrence could not be ascertained with complete objectivity. It was judged to occur in largely or entirely asymmetrical patterns where the placement of pieces suggested deliberate and critical selection. The evidence for its occurrence was strengthened if in other items the subject had constructed complex symmetrical patterns. In the third group, *linear placement* (Fig. 3, B) has already been mentioned. Here the subject merely added one piece to another in straight lines or simple curves. In *fragmentation* (Fig. 2, F), the pattern was asymmetrical as a whole but composed of separate parts, each symmetrical in itself. This behaviour was contrary to the instructions if the separate pieces did not touch, which was usually the case. In this eventuality objection was raised to the behaviour at its first occurrence but not thereafter if the subject persisted in it. In *segregation* (Fig. 3, A) the subject kept the pieces in his pattern as carefully segregated according to kind as they were when given to him.

The only significant sex-differences in the special behaviours are that semi-entire symmetry and linear placement are commoner in females. Aesthetic asymmetry is also commoner in females but the difference does not quite reach statistical significance. The findings on symmetry-level might suggest that differences between the less and the more pathological would also be reflected, within the less pathological sample, between the bright and the dull. This is unequivocally so, however, only in the case of fragmentation. In balanced reversal the difference is reflected both between the bright and dull and between the convalescent and parole. The colour-shape ratio presents paradoxical results. Although a high ratio is outstandingly commoner in the more than the less pathological it is also significantly commoner in the bright than the dull. A low ratio is significantly commoner in the dull than the bright. The explanation of this paradox is discussed below. Ratios in excess of 1 are distributed without significant differences. In linear placement the difference between the less and more pathological is reflected between the bright and dull to an extent that is almost statistically significant. The other behaviours show no differences between bright and dull. The parole show a significantly greater tendency than the convalescent to diagonal placing of the frame, a difference rather difficult to interpret.

It may be noted here that in both duplication and balanced reversal inversion of colour predominated over inversion of shape. Thus with the less pathological sample 98 instances of balanced reversal occurred in the 36 subjects showing the behaviour: 6 were of shape only, 59 of colour only, 33 of shape and colour jointly. Balanced reversal was much commoner along two axes (74 instances) than one axis (24 instances). Oblique symmetry in this sample occurred with almost equal frequency along one axis (13 instances) or two axes (17 instances).

DIFFERENCES AMONGST ITEMS

In accordance with strict methodology, a comparison of the effects of different items is precluded by the fact that presentation was in a constant order and therefore item effects were confounded with ordinal effects. Nevertheless the differences between kinds of items were so clear-cut, consistent and readily explicable that it seemed desirable to record them and discuss the results of a

TABLE VII

Mean Scores per Item

Description of Item	No. of Item	Means			
		Less Pathological Subjects		More Pathological Subjects	
		Shape	Colour	Shape	Colour
Three Shapes One Colour					
All greens	I	3·30	3·41	1·26	1·39
All reds	IV	3·18	3·31	1·40	1·82
All blacks	VI	3·24	3·33	1·62	1·72
One Shape Three Colours					
All circles	II	3·86	2·45	2·28	0·96
All triangles	III	3·08	2·14	1·29	0·71
All squares	V	3·32	2·24	2·22	0·90
Three Shapes Two Colours					
All greens and reds	VII	2·75	2·24	1·10	0·89
All reds and blacks	IX	2·72	2·11	1·04	0·93
All greens and blacks	XII	2·76	2·22	0·85	0·68
Two Shapes Three Colours					
All circles and triangles	VIII	2·83	1·82	1·02	0·75
All circles and squares	X	2·76	1·88	1·04	0·68
All triangles and squares	XI	2·82	1·99	0·98	0·66
Three Shapes Three Colours					
All pieces	XIII	2·51	1·82	0·88	0·49

tentative statistical analysis. The mean symmetry-scores per item are set out in Table VII, the items being grouped in their various kinds. The mean scores for the less and the more pathological subjects are given separately. Bartlett's test showed that an assumption of homogeneity of variance could be sustained for the less pathological subjects (chi-squared for shape 10·90, for colour 19·97, 12 d.f.) but had to be rejected for the more pathological. Comparison therefore was confined to the less pathological but the mean scores of the more pathological displayed the same general tendencies with some irregularities. Analyses of variance indicated that the mean scores per item differed very significantly for both shape-symmetry and colour-symmetry in the less pathological sample (F-ratios: shape 4·145, colour 9·221, d.f. 9 by 79). The 95 per cent. fiducial semi-interval was ·35 for shape and ·37 for colour, the 99 per cent. was ·46 for shape and ·49 for colour.

The foregoing limits suggest, in regard to shape-symmetry, that item II belongs to one population, the remaining 12-piece items to a second and the 24-piece items to a third. More doubtfully, the 36-piece item XIII may belong to a fourth population. Observation of performances and the statements of subjects concurred that circles were easiest and triangles most difficult to arrange. This quite certainly accounts for the significantly higher score on item II. The remaining differences show a very definite relationship to the number of pieces in the item. Ordinal effects are clearly of negligible importance. Practice or familiarization effects would lead to a progressive raising of scores and fatigue or boredom effects would hardly result in sharp drops only at the point where the number of pieces is increased. The data leave undetermined the relative importance of total number of pieces and number of kinds of pieces but, pending empirical investigation, the latter seems likely to have played much the greater rôle. The general conclusion appears to be that higher levels of shape-symmetry are more easily attained with some shapes than others, notably with circles, and become more difficult of attainment in proportion to the number and diversity of pieces presented.

In regard to colour-symmetry the fiducial limits suggest that the populations are: (1) three shapes and one colour; (2) one shape and three colours, three shapes and two colours; (3) more doubtfully, two shapes and three colours, three shapes and three colours. While the differences here show a fundamental dependence on the number of pieces in the item, there is palpably present a modifying factor that was absent in the case of shape-symmetry. This is readily identified as the fact that shape-symmetry is easier of attainment than colour-symmetry so that items in which the level of shape-symmetry entails the same level of colour-symmetry (e.g. three shapes and one colour) tend to score more highly than items in which the subject is directly confronted with the task of patterning according to colour (e.g. one shape and three colours). In a more complex way this fact enters into the other differences also. It is noteworthy that the higher levels of colour-symmetry are not attained significantly more easily with one colour than another.

Most of the special behaviours tended to be evoked more frequently by one kind of item than another. Over-stepping the frame and placing it diagonally both occurred principally in the later, more difficult items, especially XIII. Circular placement occurred most frequently when circles were involved, particularly with item II, and was especially rare with item III. Duplication occurred most often with items of the same shape and different colours (II, III, V); it was much rarer with items of different shapes and the same colour or with the more complex items. Pure horizontal symmetry occurred most often with the early 12-piece items. Balanced reversal was much more frequent with the later complex items than the 12-piece ones, but oblique symmetry was commonest with items II and III. Aesthetic asymmetry occurred chiefly with the later items. Fragmentation was considerably most common with item I, evidently because objection was raised at that point. Segregation was most frequent with items of the same shape and different colours, especially item II. Linear placement was somewhat commoner in the earlier items.

METHODS OF CONSTRUCTION

Throughout the foregoing account regard has been paid only to the final product. The latter is of course, the result of a dynamic process, an individual operating on presented material. A highly provisional analysis is offered here of the procedures in construction. The facts in this matter are considerably harder to ascertain than in the case of the final product, since external observation must be supplemented by hazardous inferences and self-observation is notoriously difficult in such activities. The only statement that can be made with complete confidence is that there are marked individual differences in methods of approach and working.

It would appear that the final pattern is rarely, if ever, something clearly conceived in advance towards which the subject systematically works. Only repeated practice would bring this state of affairs about. One is apt to regard the final product as in some curious way a direct expression of the subject's individuality. Its relationship to the subject, however, is nearly always indirect. It is the result of a series of interactions between, on the one hand, the subject's preferences and sets and, on the other hand, the possibilities offered by the material. In these interactions chance elements play quite a considerable rôle.

The whole process of construction is most conveniently regarded as a succession of choices made by the subject. The *first choice* is in the interpretation of the instruction: "make a pattern." As the data show, most subjects understand this to mean that the pieces are to be placed symmetrically. A few able and aesthetically sophisticated subjects take it that the pieces are to be arranged asymmetrically in aesthetically satisfying relations. At the other extreme, intellectually defective or disorganized subjects respond to the instruction merely by shuffling the pieces about, placing them in long lines or arbitrarily conglomerating them, all procedures leading to absolute asymmetry. The *second choice*, if the subject has decided on symmetrical placement, is whether to pair in relation to one axis or aim at some more complex correspondence. Pairing about one axis is a straightforward procedure to analyse. The only complication is that some subjects work along the axis in relation to which they are pairing while others work along the opposite axis. The procedures in aiming at more complex correspondences, such as double or entire symmetry, offer much greater difficulty to the analyst of the performance. It is in these that individual differences are most prominent. Some subjects work systematically round a centre, others with alternating attention to each axis, still others with simultaneous awareness of both axes and also of the possibility of rotation. Any of these procedures may finally result either in double or in entire symmetry. Subjects quite often change from one procedure to another and back again. The two choices just named, together with various lesser preferences, e.g. for entirety, reversal, etc., constitute the individual's initial and fundamental set in accordance with which he works. All subjects display a strong perseverative tendency to deal with each item in the same general manner. This is an important factor underlying the high reliability coefficients. In certain subjects the perseverative tendency is opposed by a much weaker need to vary the procedure or act differently in at least a few items. This brings about the sporadic appearance of most special behaviours.

A *third choice* arises when the subject's mode of procedure encounters difficulty in the material. The fact that the number of pieces in an item is limited, the presentation of four and only four identical pieces of each kind, the ruling that every piece must be used, all form obstacles to the subject's procedure in symmetrical placement. Some procedures and preferences meet difficulties more rapidly or more frequently than others. It is here that chance factors are quite extensively involved. When the subject finds obstacles in the material to the symmetrical construction of his pattern he may choose to add the discrepant pieces asymmetrically, to destroy what he has done and begin again (often at a lower level), or to modify his pattern so that the discrepant pieces can be incorporated into it symmetrically. The first alternative leads to imperfect symmetry. The level termed rudiments of symmetry arises rather when a subject who has embarked on symmetrical construction becomes dismayed at an early point by the general difficulties of the task. Balanced reversal may be carried out either as a deliberate variation or as a means of dealing with difficulties in the material.

When all pieces are arranged some subjects survey and check their product. Others leave it uncritically and are at once ready for the next item. Further personal differences and preferences in working may be listed here. Certain subjects show a definite preference for beginning with one shape or colour rather than another. Many subjects like to include and work round a central blank space in their patterns but others eschew this. Similarly there are subjects who like and subjects who avoid arranging pieces in long, projecting arms. Preferences of these sorts interact with the possibilities of the material to make the task less or more difficult. Some subjects resort to trial arrangements of the pieces, though most do not. Sub-vocal verbal formulations in general play little part in the procedure but some subjects rely on them to a great extent. A nice judgment of relative distance in the placement of pieces comes very easily to some persons and is very troublesome to others. Some subjects are strongly aware of the border within which the pattern is being constructed and relate their work continually to it; others are virtually oblivious of the border.

DISCUSSION

The major findings in this inquiry have been: that when mental-hospital patients are required to construct patterns they generally do so symmetrically; that the symmetry-level of such patterns can be rationally quantified; that the scores so obtained show a high degree of reliability; that the intelligence-level of subjects is the most important single factor in determining the symmetry-level of their patterns but that nevertheless certain patients of very low ability can attain a high symmetry-level; that severe behavioural pathology lowers the symmetry-level of constructed patterns; that it is doubtful whether more moderate degrees of maladjustment have any effect; that females tend to attain a lower symmetry-level than males, a difference accentuated by severe behavioural pathology; and that colour-symmetry, though showing a moderately high correlation with shape-symmetry, is definitely harder for most subjects to achieve. Matters that require further discussion are: the rôle of intelligence; the effect of social maladjustment; the sex difference; and some problems connected with colour-symmetry.

The abler patients construct patterns at a higher symmetry-level than the less able for several reasons, it would seem. At the beginning they set themselves a harder task. They find it easier to take into simultaneous account a number of different considerations. They perceive a greater variety of relations in the material and adapt their patterns more readily to the limitations of the available pieces. At the end they check more carefully what they have produced. As already remarked, a further investigation would be necessary to establish how it is that, in contradiction to the foregoing, certain oligophrenics can also attain the highest symmetry-levels. While symmetry-level scored in the manner of this investigation shows so marked a dependence on intelligence, it is noteworthy that in the mosaic test Himmelweit and Eysenck (1945) found aesthetic ability, as rated by six judges, to have no significant correlation with intelligence. A rather different point is that, if a larger number of aesthetically sophisticated subjects had been included in the bright sample, aesthetic asymmetry would probably have been much more prominent and the close relation of symmetry-level to intelligence correspondingly diminished.

The starting point of the inquiry was a suggested relationship between amount of asymmetry in patterns and degree of social maladjustment in the individual. Such a suggestion would seem to imply that the individual symbolizes in his patterns a lopsidedness in his personality or in his relationship with the community. The findings, however, indicate that if there is any relationship between social maladjustment and asymmetry it is an indirect one, mediated through impairment of cognitive functioning. Level of social adjustment in the less pathological sample had no influence on symmetry-level except doubtfully as an interactive factor with sex. The lower symmetry-scores of the more pathological sample evidently arose from cognitive inefficiency in the instances of the oligophrenics, seniles and organics. While the habit-deteriorated might be regarded as the extreme case of social maladjustment they of course also showed marked cognitive disorganization. Their performance was so closely parallel to that of the other three categories of severe behavioural pathology that their cognitive inefficiency seems much more likely than their maladjustment to be the direct and essential factor occasioning low symmetry-levels. The facts could be definitively ascertained, however, only by a careful isolation from each other of the two variables cognitive disorganization and social maladjustment.

The sex-differences in symmetry-scores obviously cannot be a matter of intellectual capacity. They seem to arise from a difference in values. Males prize a strict adherence to geometrical symmetry more highly than females do. Females prefer looser and less regular arrangements. This can readily be verified in everyday life by contrasting male and female behaviour in the arrangement of furniture in rooms, the laying of tables, the setting out of notes or records, and many other matters. Such statements of course refer to average tendencies; there are individual exceptions in each sex. Whether the difference is biologically based or a cultural matter or both must be left an open question here. The difference in relative values would appear to underlie all the sex-differences found. For example, the difference in oligophrenics would seem to be that males at that level make a greater effort than females to achieve symmetry in their patterns. With the organics and the habit-deteriorated symmetry-level is less vulnerable to impairment in males than in females because the former consider it of greater importance. This suggests a general hypothesis that highly valued capacities are more resistant to the effects of intellectual deterioration than less esteemed ones. Another aspect of the difference in values is that the higher forms deviating from rigid symmetry, e.g. semi-entire symmetry, tended to be commoner in females.

Various peculiarities in regard to colour-symmetry have been recorded in the preceding account. The split-half correlation for colour-symmetry was significantly lower in the less than the more pathological subjects. At the same time shape-scores and colour-scores showed a significantly higher intercorrelation in the more pathological subjects. A high colour-shape ratio characterized the more as against the less pathological subjects, but, paradoxically, within the latter category it characterized the bright against the dull. The fact was noted that colour-symmetry is harder to attain than shape-symmetry. The complete position, however, seems to be this: in the bright, shape-scores and colour-scores tend to coincide at a high level of symmetry; in the dull, colour-scores tend to fall below shape-scores because they are more difficult to attain; in the cognitively defective or impaired, however, shape-scores are at such a low level of symmetry that any difference from colour-scores tends to be eliminated. In other words, there is a curvilinear relationship between cognitive efficiency and the colour-shape ratio. This explains the facts cited above in regard to the correlation of shape with colour and to the colour-shape ratio. The finding in regard to split-half correlations probably arises because the colour-scores of the more pathological tend to be stable at a low level from item to item but in the dull members of the less pathological sample they tend to fluctuate in level in accordance with the possibilities of an item. The immediate reason for the greater difficulty of colour-symmetry appears to be that subjects attend primarily to shape and only secondarily to colour; more remotely, this derives from the general predominance of shape over colour in visual perception. Workers with the mosaic test, e.g. Wertham and Golden (1941), Diamond and Schmale (1944), have found that schizophrenics make a notably greater use of shape than colour in constructing their patterns. In the conditions of this inquiry, however, there was no evidence that a low colour-shape ratio characterized schizophrenics. The less pathological sample comprised 45 patients diagnosed as schizophrenics, 33 diagnosed as definitely not schizophrenics, and 2 of questionable status. There were no statistically significant differences between the schizophrenics and the non-schizophrenics in regard to mean shape-score, mean colour-score or colour-shape ratio.

The general relationships of visual perception are reflected in the construction of patterns not only in the predominance of shape over colour but also in the predominance of vertical over horizontal symmetry, cf. Gibson (1950) and Vernon (1952). Here it might be added that, as observed by Bunzel (1938), the construction of symmetrical artifacts is an almost universal human characteristic, only occasionally varied by excursions into asymmetry. Bunzel also notes the close dependence of ceramic and textile patterns on a relatively high degree of conceptual thinking. With these facts of a wider background the present findings are appropriately concordant.

SUMMARY

1. Patterns were obtained from mental-hospital patients of various categories by a technique akin to that of the mosaic test but simpler and more delimited.

2. An objective method of quantifying the level of symmetry was devised.

3. The symmetry-scores so obtained showed a high degree of reliability.

4. Inquiry was made into the effects on symmetry-level of differences in sex, intelligence and degree of social adjustment among relatively well-behaved patients. The effects of severe behavioural pathology were also investigated. Intelligence was shown to be the major factor in determining symmetry-level. Females tended to have lower symmetry-scores than males. Degree of social adjustment had no significant effect. Severe behavioural pathology tended to lower symmetry-scores and this was interpreted as essentially a cognitive phenomenon.

5. Various findings in regard to the relationship between symmetry of shape and symmetry of colour were recorded.

6. The reasons for the findings were discussed.

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REPORT ON THE LONGEVITY AND THE CAUSES OF DEATH IN MONGOLOIDISM IN THE STATE OF VICTORIA

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THE prognosis as to life in cases of mongoloidism is universally recognized as being notoriously bad. It would appear that the majority die in infancy and that many of those surviving this period succumb during the second decade. A small proportion reach the third decade, and a still smaller one survive till middle age. Brousseau in 1928 stated that few mongols reach the age of maturity, and that no mongol had reached old age. She stated that the oldest case found in medical literature at that time was a mongoloid female aged 57 reported by Langdon Down. In 1937 Tredgold stated that Langdon Down had then in his training institution at Normansfield 16 mongols over 21 years of age. Three of these were between 40 and 50, two between 50 and 60 and one male aged 63.

In reviewing longevity in mongoloidism in Victoria, attention has been confined to those cases admitted to the institutions under the control of the Mental Hygiene Department for the period covering the past 40 years. Between 1912 and 1953 there were in all 388 admissions. The 113 cases still surviving represent 7·2 per cent. of all mental defectives at present resident in these institutions. Thirty others have been discharged and their subsequent history is unknown. Two hundred and forty-five died whilst in hospital. Details of these figures are given below in the following table:

TABLE I

Present Age of Mongols still Living

	Number of Cases		
Age	M	F	Total
0–10	20	13	33
10–20	8	30	38
20–30	2	14	16
30–40	5	8	13
40–50	2	4	6
50–60	2	3	5
60–70	—	2	2
Total	39	74	113

TABLE II

Age on Discharge

Age	Number of Cases M	F	Total
0–10	3	4	7
10–20	11	3	14
20–30	6	—	6
30–40	—	2	2
40–50	1	—	1
50–60	—	—	—
60–70	—	—	—
Total	21	9	30

TABLE III

Age at Death

Age	Number of Cases M	F	Total
Under 1 year	26	54	80
1–10	49	38	87
10–20	20	11	31
20–30	12	13	25
30–40	4	5	9
40–50	6	3	9
50–60	1	2	3
60–70	—	1	1
Total	118	127	245
Total Admissions	178	210	388

An examination of these three Tables reveals that a total of 98 or 23 per cent. of admissions lived beyond the age of 20. Of these 27 (7·2 per cent.) lived beyond 40. Those reaching 50 or over amounted to 11 (2·8 per cent.) and of these 3 (·8 per cent.) reached the seventh decade, the oldest recorded case being a female patient, who died at the age of 63. Two other females, both of whom are still living, are 60 and 62 respectively.

The average age at death was found to be slightly over 10 years, whereas the figure given by Brousseau was 14. An explanation of this difference lies in the fact that apparently in the series reported by that writer relatively fewer cases had been admitted to hospital during the first few months of life, whereas in our series approximately 30 per cent. of all admissions of mongols were under the age of 3 months. In the present series under discussion, 80, or 32 per cent., of all deaths occurred before the age of one year, and 87, or 35·5 per cent., died between the ages of 1 and 10. Altogether, 167, or 68 per cent., of deaths occurred in the first decade. Thirty-one (12·6 per cent.) of deaths occurred in the second decade, 47 (19 per cent.) thus died after reaching maturity.

The causes of death were ascertained by post-mortem examination in 180 of these cases. The greatest number by far was due to acute respiratory infection, which accounted for 111 deaths. Dysentery, which took its heaviest toll during childhood, accounted for 26. As regards dysentery, it appears that after the age of 10, despite repeated infections, the expectation of survival was reasonably good. Death from Tuberculosis, including pulmonary tuberculosis, miliary tuberculosis and tubercular peritonitis, reached its maximum between the ages of 10 and 30 and thereafter was not encountered. A considerable number of cases showed small or imperfectly enclosed foramen ovale, whilst 8 cases manifested frank congenital heart disease, including pulmonary stenosis, large patent auricular or ventricular foramena. In these cases, death was due to heart failure resulting from these anomalies. No case of endocarditis recorded.

TABLE IV

	Age Groups												
Cause of Death	0 to 1	1 to 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50	50 to 55	Total
Acute respiratory infection	48	28	12	1	7	2	5	3	1	1	2	1	111
Dysentery (Bacillary)	8	6	3	—	2	1	2	1	1	1	1	—	26
Tuberculosis	—	—	1	3	3	3	2	—	—	—	—	—	12
Congenital Heart Disease	4	2	1	1	—	—	—	—	—	—	—	—	8
Malnutrition Anaemia	3	1	—	—	—	—	—	—	—	—	—	—	4
Meningitis (pneumoccocal)	—	1	—	—	1	1	—	1	—	—	—	—	4
Measles	—	1	2	—	—	—	—	—	—	—	—	—	3
Typhoid	—	1	1	—	—	—	—	—	—	—	—	—	2
Scarlet Fever	—	—	—	1	—	—	—	—	—	—	—	—	1
Sepsis	—	—	1	1	—	—	—	—	—	—	—	1	3
Nephritis	—	—	—	—	1	—	—	—	—	—	—	1	2
Imperforate Anus	1	—	—	—	—	—	—	—	—	—	—	—	1
Appendicitis	—	—	—	—	—	—	—	—	1	—	—	—	1
Peritonitis	—	—	—	—	—	—	1	—	—	—	—	—	1
Intussusception	—	—	—	—	1	—	—	—	—	—	—	—	1
Total	64	40	21	7	15	7	10	5	3	2	3	3	180

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Recent Trends in Aphasic Research

This article is confined to a limited survey of contemporary literature and research on aphasia. An attempt has been made to correlate 3 different approaches to the subject in order to bring some unification to the problems involved.

These 3 approaches investigate the pathological phenomena of speech and language, labelled aphasia, from the anatomic-physiological, the psycho-mechanistic, and the structural-linguistic points of view.

Wiener's theory, which compares the human brain and nervous system to a highly complicated calculating machine or to a telephone switchboard service, was confirmed by Penfield and Rasmussen's anatomical findings on the operating table. Their findings refute the theory of previous authors that association areas utilize transcortical pathways. Penfield suggests that the mechanism responsible for the coordination of the speech centers is more probably mediated by subcortical projection pathways.

Penfield distinguishes between inborn and acquired connection patterns. With the exception of the temporal cortex, Penfield and his co-workers could not discover any positive evidence for acquired neuron connection patterns. In the temporal cortex only, electrical stimulation and epileptic discharge were able to bring to consciousness visual memories, auditory memories, and combined memories. They deduce, therefore, that "memory" is filed in the temporal cortex.

The linguistic-structural point of view is represented by the Dutch scientist Grewel. His observations in regard to aphasic patients whose linguistic faculties have suffered seem to indicate the presence of lesions in the temporal lobe of the dominant hemisphere. According to Penfield and Rasmussen it is there, as a result of a high level of neuronal integration, that memory patterns activating speech are formed.

The different phenomena of aphasic disturbances can best be explained by lesions in the dominant hemisphere that involve the destruction or disruption of acquired patterns of neuronal pathways. The symptoms may evidence injuries to acquired afferent and efferent synaptic chains of neuronal mechanisms.

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*Glutamine, Glutamic Acid, and γ-Aminobutyric Acid in Cerebrospinal Fluids. *Ludewig, S.* 268

Effects of Chronic Barbiturate Intoxication on Motivation and Muscular Coordination

Ten male patients, addicted to barbiturates upon arrival at the Public Health Service Hospital, Lixington, Dy., who volunteered for the study were maintained on large doses of secobarbital (Seconal) for periods ranging from 35 to 90 days. Reaction times to visual stimuli and quantified measures of muscular coordination were taken (*a*) during the last week of addiction (intoxication), (*b*) after abrupt withdrawal of the drug, and (*c*) after recovery from drug effects.

Great loss of co-ordination was found during intoxication and during the first eight days of the withdrawal period, with gradual improvement continuing through the remaining 10 days. Reaction time was found to be very greatly impaired during intoxication and early in the withdrawal period; but, unlike coordination, it showed significant improvement soon after withdrawal and thereafter gradually returned to the control level.

Differences in reaction time corresponding to various foreperiods, or delay times, were evaluated as motivational differences; i.e. they were evaluated as differences in ability to develop a "set" or a "readiness to respond". Insensitivity to changes in foreperiods was found during intoxication. Sensitivity increased after withdrawal of the drug and was apparently normal after three to five months of enforced abstinence.

In view of the observed severe muscular incoordination and lack of ability to acquire and maintain readiness to respond, it was concluded that the general behavior of chronic barbiturate users is very severely impaired. They lack the ability to prepare for and react efficiently in performing manipulative tasks. It appears, moreover, that they could not anticipate emergencies and that they would be very unsafe machine operators.

(Authors' Abstr.)

Morphology of the Testes in Schizophrenia

An evaluation of testicular morphology in schizophrenia has been made through the utilization of bilateral testicular biopsies in 23 patients with typical schizophrenia. Of these, 16 were designated as non-institutionalized, since they were studied shortly after their first hospitalization, and the remaining 7, as institutionalized, since they had been hospitalized for a number of years. Eleven patients were in the paranoid subgroup. In four of these the testicular histology deviated from the normal, but in two of the four the degree of abnormality was regarded as slight. The three patients in the subgroup of simple schizophrenia and the three patients in the subgroup of hebephrenic schizophrenia had normal testes. Only in the subgroup of the catatonic type, in which the testes of five of the six patients showed significant departures from the normal, was there a suggestion of a relationship between schizophrenia and testicular structure.

The observed testicular defects were not unique for patients with schizophrenia but were similar to those that have been observed in many men whose only complaint was infertility.

The data suggest that chronicity of illness and nutritional deficiency are related to testicular atrophy. It may be hypothesized that the longer the duration of illness, the greater the chance for subclinical nutritive failure to occur, particularly in patients with catatonia, and to be reflected in the testicular morphology.

It may be concluded that specific abnormalities of testicular structure and function do not characterize schizophrenia.

(Authors' Abstr.)

Glutamine, Glutamic Acid, and γ-Aminobutyric Acid in Cerebrospinal Fluids

The glutamine concentration of cerebrospinal fluid in patients with a variety of neurological disorders was found to have a mean value of 7·35 ±2·0 mg. per 100 cc. No relation could be established between glutamine concentration and the type of disorder. Glutamic acid was either absent or present only in traces. γ-Aminobutyric acid could not be detected in any of the fluids investigated.

(Author's Abstr.)

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Anxiety and Depressive States Treated with Isonicotinyl Hydrazide (Isoniazid)

Of 41 patients suffering from anxiety or depressions of the agitated, psychoneurotic, or manic-depressive types, 28, or 68·3 per cent. improved after receiving isoniazid.

Of the 21 patients who had required electric shock therapy for previous episodes, 13, or 59·1 per cent., improved on isoniazid alone.

Of the 13 patients considered failures, 5 failed to show improvement even after receiving subsequent electric shock therapy.

Some improvement was usually noted within three weeks if the patient was going to respond.

If oral administration of isoniazid fails to produce improvement, the parenteral route should be tried.

Isoniazid can be administered safely to diabetic patients.

Isoniazid used in conjunction with electric shock therapy may reduce the number of treatments necessary.

(Authors' Abstr.)

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*Electroshock and the Rat Adrenal Cortex. *Royce, J. R., and Rosvold, H. E.* 516

A Quantitative Test of Theory and Diagnostic Indicators of Childhood Schizophrenia

1. Childhood schizophrenia is characterized by a disturbance in the regulation of maturation processes at both biological and psychological levels.
2. The dominance of tonic-neck-reflex motility is a particularly striking example of the maturational lag and unevenness of development.
3. The schizophrenic child has basic difficulties in boundaries and segregation of physiological and psychological subsystems.
4. The disorder is characterized by its pervading to some extent virtually all major areas of functioning, in contrast to the more specific concentration of symptoms in single areas among neurotic children and those with primary behavior problems.
5. The concept of plasticity characterizes the behavior and organization of the schizophrenic child in virtually all these areas.

(Authors' Abstr.)

Use of Electro Convulsive Therapy in Morphine, Meperidine and Related Alkaloid Addictions

Electric convulsive therapy has occasionally been mentioned in the literature as a valuable method of treating withdrawal symptoms in cases of drug addiction. In the authors' experience with this measure they have found it uniformly effective. Recently, opinions have been expressed that statistical evidence has not been presented to justify this method. They present the cases summarized in the Table in the hope that others may use a treatment they have found safe and valuable. It is their opinion that additional studies should be made until ample statistical evidence is available to evaluate electric convulsive therapy as a means of alleviating withdrawal symptoms.

(Authors' Abstr.)

Prognosis in Psychiatry

Some pertinent impressions formed from experience in evaluating psychiatric therapies may be mentioned.

1. Certain inadequacies in published reports have made it impossible to evaluate some promising new therapies. The value, in statistical terms, of psychoanalysis and such new techniques as those of Sechehaye, Rosen, Whittaker, and Fromm-Reichmann is really not known. The results of carbon dioxide and corticoid therapies and of recent modification of electric shock techniques, for example, have not been assessed.
2. The use of improvement rates has limitations in evaluating a method of therapy. It does not indicate the shortened duration of hospitalization or disability, the decreased discomfort when hospitalization must continue, or the less obvious attenuation of antisocial or self-detrimental behavior patterns.
3. A review of the literature gives one the impression that there is no room for dogmatism with regard to methods of therapy, factors making for the maintenance of remission, and essential elements in the process of therapy.
4. The type of research which studies and categorizes individual treatment methods is apt to lose sight of the multiple aspects or levels of function of the patient. Compartmentalization in study and therapy is all too common. It directs attention too singly to mind, body, or environmental, cultural, and social factors. Modern psychiatry has developed many techniques. A multiple-factor or multiple-level approach to therapy is often indicated. Simultaneous applications of such techniques as insulin therapy, psychotherapy, environmental manipulation, and expression through art might produce significantly better improvement rates than those reported with special emphasis on an individual method of treatment. In insulin therapy, for instance, 66 per cent. of patients failed to make a marked improvement. These statistics do not reveal that many of these patients later may respond to therapy of a different type.
5. Statistics reported here offer strong evidence that the process of mental illness is at times reversible and that this reversibility can be enhanced by therapeutic intervention. This points the way to an important field of future research.

(Authors' Abstr.)

Treatment of Epilepsy with Mysoline

In a series of 30 epileptics, Mysoline was added to other anticonvulsants in treatment of 28 patients and was the only drug employed with 2 others.

Mysoline was most effective in patients with grand mal and focal seizures, either alone or combined. In 78 per cent. of these patients the condition improved.

No effect on the number or frequency of psychomotor seizures was observed.

Mysoline appears to increase the frequency and number of petit mal seizures.

The commonest side-effects were (*a*) a feeling of drowsiness, drunkenness, and lethargy, relieved in most instances by the addition of amphetamine sulfate; (*b*) a papulovesicular eczematoid eruption, which promptly subsided with decrease in the doses and did not reappear upon the resumption of the original dose; and (*c*) an acute vestibular reaction following the ingestion of the first Mysoline tablet and characterized by intense vertigo, nausea, vomiting, severe ataxia, nystagmus, and, in one instance, vasomotor collapse. No blood dyscrasias or abnormal urinary findings were observed.

(Authors' Abstr.)

Differences Among Epileptics and Between Epileptics and Nonepileptics in Terms of Some Memory and Learning Variables

Both patients with idiopathic and patients with symptomatic epilepsy show somewhat similar impairment in performance on memory and learning tasks. Though there are differences in pattern of impairment between the two groups, each is more like the other than either is like the nonepileptic group.

Both epileptic groups showed the greatest impairment on delayed reproduction of designs.

The group with idiopathic epilepsy differed most from the group with symptomatic epilepsy on reproduction of meaningful material.

Since both new procedures (tactual learning, Procedure V; and complex auditory perceptual task, Procedure VII) differentiated epileptics and nonepileptics, they would appear to be useful and to merit further investigation.

(Author's Abstr.)

Electroshock and the Rat Adrenal Cortex

A significant increase in adrenal weight, from 20 to 40 per cent. has been observed in male albino rats after chronic electroshock administration.

During the hours immediately following a single electroshock, a depletion of adrenal ascorbic acid and cholesterol has been noted.

Twenty-four hours after the 10th, and final, electroshock in another group of animals, an increase in the total ascorbic acid content, proportionate to the increase in weight, of the hypertrophied adrenals was found. This suggests a functional hypertrophy.

Animals receiving the anticonvulsant drugs mephenesin and DEP (diethyl-propanediol) did not have a convulsion following electroshock administration, and their adrenals were enlarged. However, animals receiving the drugs alone also showed a significant adrenal hypertrophy.

Animals which were rapidly given 10 nonconvulsive electroshocks while in the tonic-extension phase of a previously administered electrogenic convulsion showed a significant adrenal hypertrophy, above that of controls receiving only one electroshock.

No adrenalectomized animals survived longer than a 12-day course of daily electroshocks, and each required continual artificial respiration after each shock, prior to death.

Adrenalectomized animals bearing intraocular transplants of newborn-rat adrenal survived a 16-day course of daily electroshocks and required no artificial respiration. A very rapid growth and maturation were noted in one of these transplants.

A discussion of these observations, as well as the possible mechanisms by which electroshock exerts its endocrine effects, is presented.

(Authors' Abstr.)

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Cerebral Cortical "Inclusions" in Psychoses

1. Thirty-four biopsies obtained at time of open pre-frontal lobotomy on psychotic human patients were selectively studied for the presence of specific granules.
2. All of the cases were studied in relation to an apparent developmental sequence. The granules were first developed in the nerve cell cytoplasm, extruded into the interstitium (free or within glial cells) and finally lodged in the perivascular cells and cells of the vessel wall and probably in the cells of the inner layers of the leptomeninges.
3. In a study of 34 biopsies, changes were found which were interpreted by the criteria described as early quiescent in three cases (9 per cent.); early active in 4 (12 per cent.); active in 12 cases (35 per cent.); advanced quiescent in 8 (23 per cent.); and in 7 (21 per cent.) the histopathologic conditions were judged as being advanced and active.
4. The quantitative variation in the several cerebral locations of these specific granules in this series is presented in tabular form.
5. The pathologic changes previously reported in the literature are confined in this series but a conservative interpretation is emphasized.
6. The possible chemical and clinical and morphologic importance of these "inclusions" is briefly discussed.

(Author's Abstr.)

Histologic Changes in the Organ of Corti with Intense Sound

The histological changes in the organ of Corti following exposure of a large number of guinea pigs and 7 dogs to higher frequencies (4 to 40 keps) at intensities of 138-165 db. for one-half to 4 minutes are described.

The sound source was a specially constructed siren capable of producing sound pressures in excess of 150 db. in the range of 400 cps. to 30 keps.

The extent of changes in the organ of Corti and in relation to the basilar membrane varied with the frequency, intensity and duration of exposure. With increase in intensity the injury became more marked and usually shifted in position closer to the region of the round window. The post-exposure life of the animals was purposely varied from zero to 132 days. No further progression of changes was found for the organ of Corti along the basilar membrane with prolonged post-exposure life. The alterations that were immediately discernible after exposure became more definite and degenerative changes more pronounced. At the high intensities used for the exposures marked injury to the organ of Corti was found to be in only fair agreement with the principles of tone localization for the cochlea.

Marked histological changes consisted of removal of the organ of Corti from the basilar membrane, loss of external hair cells with remainder of organ of Corti intact, degeneration of nucleus and cytoplasm of hair cells still in place, loss of the basal attachment of Deiter's cells with subsequent degenerative changes and collapse of tunnel rods (usually the external rod with distortion of organ of Corti). Among the additional histological changes not confined to the organ of Corti were degenerative changes in the stellate connective tissue cells of the limbus. This was usually located in regions for which the changes in the organ of Corti were not marked. The mesothelial cells on the under surface of the basilar membrane were usually lost in the same areas for which the organ of Corti had become detached. Peripheral nerve fiber and spiral ganglion cell degeneration appeared in about 10 days' post-exposure life and became marked in 20 to 30 days for those areas in which the hair cells were lacking.

(Author's Abstr.)

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Flickered Light as a Provocative Test in Electroencephalography

1. Eighty-eight per cent. of the patients in this series exhibited photic driving.
2. The amount of driving in the slow, alpha, or fast range varied directly with the amount of slow, alpha, or fast activity, respectively, in the spontaneous record.
3. The quality of the response improved with the subject's age and with the sensitivity of his spontaneous alpha activity to eye-opening.
4. The appearance of slow activity in bursts failed to permit photic driving in the slow range.
5. All other considerations of personal characteristics or diagnosis exhibited an indirect effect only by virtue of their influence on the fundamental variables mentioned above.
6. These characteristics make the examination for photic driving a useful adjunct to the routine electroencephalographic examination.

(Author's Abstr.)

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Personality Changes after Operations on the Cingulate Gyrus in Man

Changes in personality in eight undeteriorated patients following bilateral ablations in the anterior cingulate region are described. The lesions were small, 3 cm. long and 1 cm. wide, and great care was taken to avoid damage elsewhere. Changes were slight, but consistent: they are confined chiefly to a reduction of inhibition, perseveration, and excessive self-concern.

(Authors' Abstr.)

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A Method for the Combined Staining of Cells and Fibers in the Nervous System. *Kluver, H., and Barrera, E.* 400

Effects of Convulsions Induced by Various Types of Electric Stimulation Upon the Cerebrospinal Fluid

1. The effect of electrically induced convulsions upon the cerebrospinal fluid (CSF) was studied in 22 dogs; one group was submitted to sine waves, the other to brief rectangular pulses.

2. No significant changes were found in the CSFs following stimulation with rectangular pulses.

3. A statistically significant transitory increase of the specific absorption of the CSF at λ 265 mμ appeared following stimulation with sine waves, while the procedure failed to produce a definite change in the ascorbic acid and protein content of the CSF.

4. The increase of the specific absorption at λ 265 mμ not explainable by changes of the ascorbic acid or protein content probably is due to nucleic acids or their cleavage products and is regarded as a sign of injury to the central nervous system.

5. The power applied to the brain and resultant heat production are, on stimulations with sine waves, a multiple of the corresponding values encountered on stimulations with the brief rectangular pulses used. This difference may explain the different effect of the two types of currents upon the cerebrospinal fluid.

(Authors' Abstr.)

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Cerebellar Increase of Postural Tonus after Deafferentation and Labyrinthectomy. *Terzuolo, C., and Terzian, H.* 551

Regulation of Posture in Intact and Decerebrate Cat. 1. *Cerebellum, reticular formation, vestibular nuclei*

1. Selective, unilateral ablation of the medial cortex of the anterior lobe of the cerebellum in the cat decerebrated above or below the pons (also in the intact animal) results in a posture of ipsilateral extension and contralateral flexion of the limbs. Subsequent destruction of the ipsilateral fastigial nucleus completely reverses the cortical posture. Thus cortex and its nucleus of projection exert opposite influences on postural tonus. The fastigial nucleus, in addition to relaying cortical activity, has an important extra-cortical function.

2. Unilateral destruction of Deiter's vestibular nucleus results, in the decerebrate animal, in ipsilateral flexion and in contralateral extension of the limbs, similar to that following fastigial lesion. Bilateral destruction of Deiter's nuclei in the decerebrate animal gives an appreciable reduction, but not an abolishment, of extensor rigidity. Decerebrate rigidity is not dependent on the integrity of the vestibular nuclei.

3. Decerebrate rigidity is abolished by combined destruction of fastigial and Deiter's nuclei, leaving the pontobulbar reticular formation intact. This part of the reticular formation, as far as postural tonus is concerned, is not intrinsically active, but is dependent on activation from other sources.

4. Decerebrate rigidity is not abolished by brain stem transection at least as far caudal as the rostral part of the trapezoid body, providing neither fastigial nor Deiter's nuclei is injured. The evidence cited in 3 and 4 shows conclusively that only a small part of the brain stem reticular formation is sufficient to maintain decerebrate rigidity, providing that this part is activated from certain sources. Important among these are the fastigial and vestibular nuclei.

New explanations are offered on the basis of these observations for the dual function (stimulation and rebound) of the cerebellum on postural tonus, and for the mechanism of decerebrate rigidity.

(Authors' Abstr.)

Electrical Excitability of Human Uncus

1. The electrical excitability of the uncus was investigated in six psychotic patients under general anesthesia prior to topectomy. Employing respiratory inhibition as an indication of excitation, three strength-pulse width curves with frequency constant at 100/sec. and three strength-frequency curves with pulse width constant at 5·0 m.sec. were determined in different subjects.

2. Alterations of pulse width in the strength-pulse curves and alterations of frequency in the strength-frequency curves changed the intensity requirements for producing respiratory inhibition but did not alter the nature of the response.

3. The strength-pulse width curves are essentially similar to strength-pulse width curves previously obtained for the motor cortex and they indicate that the most effective stimulus for eliciting respiratory inhibition from the uncus is one with a pulse duration of 2·5-5·0 m.sec.

4. The strength-frequency curves differ from strength-frequency curves previously obtained for the motor cortex and indicate that the most effective frequencies for eliciting respiratory inhibition from the uncus lie in the range 30-100/sec.

5. The excitability characteristics of such structurally and functionally different cortical areas as the uncus and motor cortex differ in terms of the intensity-frequency relationships for the two different regions. The uncus can be optimally excited at lower frequencies than the motor cortex.

(Authors' Abstr.)

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Five Years' Experience with Disulfiram in the Treatment of Alcoholics

From the treatment of more than 2,000 alcoholics with disulfiram over the past 5 years, the following conclusions seem justified.

1. The only contraindications for treatment with disulfiram are marked cardiac decompensation and administration of the drug without the knowledge of the patient.
2. Routine physical examinations with routine laboratory checks prior to the initiation of treatment have proved sufficient.
3. Disulfiram can be given to non-intoxicated patients on their first visit to the clinic.
4. Intoxicated patients, whether new or cases of relapse, should be given disulfiram in a reduced dosage and always in combination with an antihistaminic drug (such as Promethazine) and sodium chloride. This combination prevents nausea and vomiting while providing sufficient sedation. Furthermore, the symptoms of hangover and the craving for alcohol are considerably reduced, if not abolished, during the immediately following period. There seem to be no contraindications for the use of this method to sober up intoxicated patients.
5. The possibilities for psychological exploitation of the circumstances of a relapse should not be neglected.
6. Disulfiram should not be given in dosages larger than necessary. Patients with a "low hyperactivity limen" or "low amnesia limen" should receive lower dosages from the beginning of treatment.
7. There are no side effects so serious as to require discontinuance of treatment but the presence of unwanted side effects should be considered at each consultation with a view to adjusting the patient to a minimal effective maintenance dose.
8. With a well-adjusted maintenance dose of disulfiram and the ingestion of about 6 cc. of absolute alcohol, a slight sensation of heat, redness and acceleration of the pulse rate should be the only symptoms seen.
9. Usually the effects of disulfiram will increase during the first 3 months of continued treatment. During these months it is important not to establish any fixed maintenance dose but to follow the patient at regular intervals and make indicated adjustments of dosage.
10. Individual or group psychotherapy or both, along with club activities such as Alcoholics Anonymous provides, are successfully linked with the use of disulfiram. Relaxation therapy is also a valuable adjunct.
11. Concerning "prealcoholics", a warning is given against routinely advising such patients to become abstainers for the rest of their lives.
12. Disulfiram is a valuable and safe medication in the hands of the physician provided the outlined recommendations are followed.

(Author's Abstr.)

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Induced Loss in Cerebral Tissues of Respiratory Response to Electrical Impulses, and its Partial Restoration by Additional Substrates. McIlvain, H., and Gore, Marion B. R. [*Biochem. J.* (*London*), **54,** 305 (1953).]

Cerebral tissues are the most sensitive to blood-sugar levels. Study of unresponsiveness of tissues to electric impulses involves some understanding of the normal linkage between the applied impulse and metabolic response. The latter involves substrate and labile phosphates and an ionic transport system presumably capable of maintaining a polarized membrane. At some stage of the process the substrate system apparently fails, this stage being specific to respiration as distinct from glycolysis. The ability of the cerebral cortex slices to increase respiration with glucose as substrate, on applying electric impulses, survives various adverse conditions such as exposure for several hours to 0°, passage of prolonged impulses, or metabolic activity in the absence of substrate. Application of impulses in the absence of substrate changed the tissue so that its respiration no longer increased when glucose was provided and the impulses applied. Respiratory response could be partly restored by the addition of fumaric or malic acid. S. MORGULIS (Chem. Abstr.)

Enzymic Cleavage of the Stimulating Substance of the Sensory Nerves, its Dependence on the pH, and Inhibition by Central Stimulators. Umrath, Karl. [*Naunyn-Schmiedebergs Arch. exptl. Pathol. Pharmakol.*, **219,** 148 (1953).]

Sensory nerves of mammals contain a stimulator substance that is tested by the denervated rabbit ear in which it produces reddening. The substance and an enzyme that splits this stimulator were prepared from the posterior spinal roots of cattle by extraction with a solution of 0·65 per cent. NaCl and 0·01 per cent. $CaCl_2$. The enzymic cleavage of the excitor substance is inhibited markedly at pH 8, more at pH 9, and also below 5. Centrally stimulating substances such as santonin, atropine, and caffeine act similarly to metrazole, brucine, picrotoxin, and strychnine in that the convulsion-producing quantities *in vivo* parallel the quantities which inhibit *in vitro* the enzymic destruction of the excitor substance. Between convulsive action and cholinesterase inhibition there is less parallelism; picrotoxin is a strong convulsant but inhibits cholinesterase slightly whereas caffeine is a weak convulsant with high inhibition of the enzyme. A. E. MEYER (Chem. Abstr.)

Correlation between Metabolisms of Carbohydrate and Nitrogen in the Brain Tissue. Kimura, Yukichi, and Ito, Kaoru. [*Sci. Papers Coll. Gen. Educ., Univ. Tokyo*, **2,** 157 (1952).]

Various forms of N were found to diffuse out from brain-cortex slices respiring in Krebs-Ringer-bicarbonate solution containing glucose. The ratio of soluble N to total N (1) and of ammonia N to soluble N under normal conditions did not exceed 15 per cent. of the total N content of the tissue. The rate of N diffusion fell off with time. However, (1) was maintained at a constant of approximately 25. Absence of glucose caused an increase in N diffusion, especially NH_3, which was not reduced by the addition of glucose. Mannose caused a sparing action on N diffusion but galactose and fructose were effective only to a slight extent. With respect to NH_3 production the effects of natural monosaccharides were of the same order. Di- and polysaccharides had no effect. The sparing action of glucose was increased by excess KCl. Grinding of brain tissue caused a marked diffusion of N into solution.

J. D. TAYLOR (Chem. Abstr.)

Glycolysis and Cytochemistry of Cerebral Cortex. Dixon, K. C. [*J. Physiol.*, **120**, 267 (1953).]

The superficial layer of the rabbit cerebral cortex (1) showed greater anaerobic glycolysis than deeper layers. Sections of the upper layer of rabbit (1) stained intensely by the tetrazo method of Danielli (*Symposium Soc. Exptl. Biol.* (1), 101-13 (1953)) showed a large concentration of dendrites and fibers of the pyramidal cells (11) and relatively few nerve cells, in contrast to highly cellular deeper layers. It is concluded that the dendritic processes of the (11) possess a high glycolytic rate and that dendritic metabolism probably accounts for much of the glycolytic activity of the (1) as a whole. From the staining reaction by the tetrazo method, a large part of the protein appears to be present in the ground substance which consists of ramifying neuronal processes. MORRIS ROCKSTEIN (Chem. Abstr.)

Biochemical Changes in Protoplasm in Conditions of Excitement and under Narcosis. Bubanović, Fran. [*Bull. soc. chim. Belgrade, No. Jubilaire* 1897-1947, 49-63 (Pub. 1951).]

NIKOLA PLAVŠIĆ (Chem. Abstr.)

Changes in Sorptive Properties of Nerve Cells of Rat Brain under the Influence of Conditioned Reflex Stimulant. Romanov, S. N. [*Doklady Akad. Nauk. S.S.S.R.*, **90**, 117-20 (1953).]

White rats in which a conditioned reflex of running away from a charged electrode system was developed (in conjunction with an electric light bulb operated with a loud-sounding switch) were examined as to sorption of neutral red by their brain tissue. Considerable changes were observed in this respect in the nerve cells of the brain and the spinal ganglia; the sorption is super-normal at first but gradually declines to nearly normal level in the brain and to some 80 per cent. of normal in the spinal ganglia in the course of 6-7 days. The changes are not associated with any actual movements of the animals, for these can be excluded with suitable modification of the environment. G. M. KOSOLAPOFF (Chem. Abstr.)

Content of Creatine Phosphate in the Brain Tissue during Dying and after Subsequent Revivification. Shuster, M. I. [*Arkh. Patol.*, **15**, *No.* 2, 55 (1953).]

In dog brain frozen *in situ* after Et_2O narcosis the content of creatine phosphate P is 5·3-10·2 mg. per cent. In the course of dying from blood loss, creatine phosphate is decomposed and at the time of the terminal pause it is totally absent; the rise of inorganic P is caused by this decomposition. Near death, the rise of inorganic P is caused by decomposition of adenosine triphosphate and from other unknown sources. During revivification of the animal (injection of heparinized blood and artificial respiration) up to restoration of breathing there occurs resynthesis of creatine phosphate and adenosine triphosphate with corresponding decline of inorganic P in the brain tissue. G. M. KOSOLAPOFF (Chem. Abstr.)

Excitation and Conduction in the Nervous System. Larrabee, Martin G., and Edwards, Charles. [*Ann. Rev. Physiol.*, **15**, 283 (1953).]

Among other aspects of the conduction of impulses in nerve fibers the role of ions is fully reviewed. RACHEL BROWN (Chem. Abstr.)

Paper Electrophoresis of Cerebrospinal Fluid. Peters, H. J. [*Chem. Weekblad.*, **49**, 248 (1953).]

In order to obtain suitably differentiated paper electrophoresis diagrams it is necessary to have samples with a protein content of about 40 g./1. Since a normal cerebrospinal fluid has a protein concentration of only 250 to 400 mg./1, the problem is resolved into one of concentrating the sample 100 to 200-fold without damaging or altering it. Because of the high NaCl content (7 g./1) in cerebrospinal fluid, concentration to the extent required is not possible by ordinary vacuum evaporation techniques. A method was developed for concentrating such samples by utilizing a combination of centrifuging and ultrafiltration. The fluid is centrifuged for 4 hours in contact with small collodion bags which are supported by a perforated ebonite tube suspended in a 25 ml. centrifuge tube containing the fluid to be concentrated; a 20-to 60-fold concentration results, the exact amount of concentration depending on the thickness of the membrane. A further factor of 4 is realized by applying 4 times the normal amount of sample (0·08 ml. instead of 0·02 ml.) to the paper strip to be used for the electrophoresis experiment by the method of van Os. The accuracy of this method for concentrating samples is checked by running experiments on blood serum that has been diluted 100-fold with 0·9 per cent. NaCl solution, reconcentrated by this method and compared with results from experiments made on a sample of the original undiluted serum. Results of several such checks are tabulated, and e.g. in one experiment the serum albumin content was found to be 38·3 per cent. when the serum was analyzed directly, but 37·5 per cent. from analysis of the diluted and reconcentrated sample. F. C. SNOWDEN (Chem. Abstr.)

The Formation of Ammonia in Brain Extracts. Muntz, John A. [*J. Biol. Chem.*, **201**, 221 (1953).]

An enzyme system present in an Me_2CO-powder extract of dog brain deaminates muscle adenylic acid to inosinic acid. Adenosine triphosphate (ATP) is required for the reaction, but there is no loss of adenyl pyrophosphate or apparent deamination of the polyphosphate. It is active over a broad pH range, with an optimum at pH 7. In these respects the system differs from Schmidt's deaminase and is distinct from enzymes previously described which deaminate adenosine or its phosphorylated derivatives. Because of the myokinase, which is also present, ATP alone can serve as a source of NH_3 when a suitable phosphate acceptor such as fructose 6-phosphate is added to the system. FELIX SAUNDERS (Chem. Abstr.)

Essentiality of Acetylcholinesterase in Conduction. Wilson, Irwin B., and Cohen, Max. [*Biochim. et Biophys. Acta*, **11,** 147 (1953).]

A method is described for assaying acetylcholinesterase in the intact nerve, and thus for testing conduction in relation to enzymic activity at any time without grinding the nerve. The use of acetylcholine (1) which does not penetrate readily into the axoplasm of the fiber, results in the assay of only a portion of the enzyme, the "external" enzyme, whereas the use of $Me_2NCH_2CH_2$-OAc (2), which penetrates barriers impermeable to (1) allows the assay of "internal" enzyme. There is probably about 3 times as much internal as external enzyme. Inhibitors which do not produce conduction block, such as prostigmine, tetraethylpyrophosphate, and decamethonium, almost completely inhibit the external enzyme, but inhibit hydrolysis of (2) by only about 50 per cent. Inhibitors which block conduction, such as diisopropyl fluophosphate (DFP) and eserine, inhibit both enzymes. DFP blocks conduction when total enzyme inhibition reaches about 80 per cent. Internal enzyme activity increases and external enzyme activity decreases under the influence of x-irradiation, which does not impair conduction. MORTON PADER (Chem. Abstr.)

Ability of Some Carboxylic Acids to Maintain Phosphate Levels and Support Electrical Stimulation in Cerebral Tissues. Kratzing, C. C. [*Biochem. J.* (*London*), **54,** 312 (1953).]

Normally the energy requirements of the mammalian brain are provided by glucose, which is metabolized to CO_2 and H_2O or partially to lactate and pyruvate. The glucose also aids in maintaining the creatine phosphate. Slices respiring in pyruvate exhibit respiratory response to electric impulses so that glycolytic breakdown of glucose is not essential to response. Other carboxylic acids do not call forth respiratory responses to impulses nor do they support high levels of energy-rich phosphates. Respiration in glucose or pyruvate depends on the Ca-ion concentration of the medium. Respiration of slices metabolizing 0·02M succinate, α-ketoglutarate, citrate, or fumarate is not increased by passage of electric impulses. In slices respiring in glucose, citrate, or succinate, during passage of electric impulses, there is a significant fall in energy-rich phosphate. S. MORGULIS (Chem. Abstr.)

Neutral Steroid Excretion by Normal and by Schizophrenic Men. Mittelman, Arnold, et al. [*J. Clin. Endocrinol. and Metabolism*, **12,** 831 (1952).]

Schizophrenic men excreted a larger amount of β-ketosteroids but less nonketonic steroids than the group of normal men. Basal urinary nonketonic neutral steroids determined as $SbCl_3$ chromogens were lower in the schizophrenic subjects than in the normal controls. The administration of 25 I.U. of corticotropin (ACTH) increased all types of ketosteroid output in all of the subjects. The increase shown by the schizophrenics tended to be less than that of the control group of similar age, but the β-ketosteroid output of the schizophrenics was still significantly higher than that of the controls. The output of $SbCl_3$ chromogens in young normal males was significantly higher than in the schizophrenic patients. After ACTH, the nonketonic neutral steroid excretion was reduced in the control subjects, but was elevated slightly in the schizophrenics. However, the output of the latter group was still much less than that of the control subjects. The significance of these findings is discussed.

N. R. STEPHENSON (Chem. Abstr.)

The Relation of the Blood-Protein Values of the Epileptic to the Incidence of Attacks. Grodzicki, Wolf D. [*Psychiatrie, Neurol. med. Psychol.*, **2,** 166 (1950); *Chem. Zentr.* (1950), (11), 2458).]

Determinations of the blood-protein level made on 65 true epileptics gave total protein values higher than normal. The albumin was always essentially higher than the globulin. The appreciable periodic fluctuations in all the serum-protein values corresponded to the rhythm of the attacks and to fluctuations in electrolytes, in the acid-base balance, etc. Shortly before an attack the albumins reached their highest value while the globulins reached their lowest. Refractometric methods did not prove useful for this investigation.

M. G. MOORE (Chem. Abstr.)

Thymol-turbidity Test in Schizophrenia. Nandi, D. N. [*Indian J. Med. Research*, **40,** 295-302 (1952).]

The thymol-turbidity test as described by Maclaglan is an indirect measure of liver dysfunction. Turbidity is due to the formation of a lipo-thymo-protein (β- and γ-globulins) complex and a change in this test indicates some metabolic disorder in connection with lipides and proteins. This test was applied to 55 schizophrenics, 20 normal subjects, and in 10 cases of confirmed liver damage. Serum (0·15 cc.) was mixed with 9 cc. of thymol-barbital buffer (pH 7·8). Transmission was observed after 30 minutes in a photoelectric colorimeter at 640 mμ and the test units were calculated from a standard transmission curve prepared from $BaSO_4$

standards. The following average results were obtained: normal subjects, 2·7 units; liver-damage subjects, 9·2 units; simple schizophrenics, 3·7 units; hebephrenic schizophrenics, 5·4 units; paranoid schizophrenics, 5·4 units; catatonic schizophrenics, 9·5 units. Five cases of catatonic schizophrenia were tested in different clinical states. Each case, when improved or cured, showed a marked drop in the thymol-turbidity test units. Unquestionably the severity of the disorder in protein and lipide metabolism is directly related to that of the clinical state. PRISCILLA B. HORTON (Chem. Abstr.)

Studies in the Schizophrenic Metabolism: a Study of Liver Function by the Benzoic Acid Test of Quick, et al. (1938). *Nandi, D. N.* [*Indian J. Med. Research*, **40**, 303 (1952).]

Quick's benzoic acid test of liver function based on the ability of the liver to conjugate injected benzoic acid with glycine as measured by the urinary excretion of hippuric acid, was applied to 7 normal subjects, 50 schizophrenics, and 9 subjects with definite hepatic damage. Average results obtained for excretion of hippuric acid after injection of 1·77 g. of Na benzoate were as follows: normal subjects, 0·83 g.; subjects with hepatic damage, 0·50 g.; catatonic schizophrenics 0·41 g.; hebephrenic schizophrenics, 0·70 g.; paranoid schizophrenics, 0·60 g.; simple schizophrenics, 0·80 g. Five catatonic schizophrenics were studied at intervals in different mental states. In each case the excretion of hippuric acid increased when the patient improved or was cured. Since this test measures certain aspects of protein metabolism, it is concluded that there is an alteration in protein metabolism in schizophrenia varying with the severity of mental symptoms. PRISCILLA B. HORTON (Chem. Abstr.)

Distribution of Substance P in the Central and Peripheral Nervous System. Pernow, B. [*Nature*, **171**, 746 (1953).]

Substance P (1), a polypeptide capable of producing a transient fall in blood pressure, was found in the highest concentration in the gray matter of the dog brain. Activities of the different parts of the central nervous system (c.n.s.) run almost parallel with acetylcholine content except in extracts of the hypothalamus. The amounts found in the peripheral nervous system were generally lower than in the c.n.s. The dorsal roots, the preganglionic sympathetic fibers, and the vagus especially were rich in (1), whereas motor nerves such as phrenic had low content. J. D. TAYLOR (Chem. Abstr.)

Clinical Study of Adrenochrome. Cauwenberge, H. van, and Lecomte, J. [*Lancet*, **264**, 98 (1953).]

The urinary excretion of reducing steroids and 17-ketosteroids was established in patients who had had an intravenous injection of 1 mg. of adrenochrome twice daily for 5-10 days and in other patients who had had 9 mg. of adrenoxyl (the semicarbazone of adrenochrome) in 3 doses every 24 hours for 3 successive days. No significant change was found in the urinary excretion of the steroids although there was a significant and regular decrease in the circulating eosinophils. BARBARA R. MURRAY (Chem. Abstr.)

Methyl Alcohol Poisoning with Particularly Pronounced Changes in the Brain. Pathology of the Permeability of Brain. Orthner, H. [*Virchow's Arch. pathol. Anat. u. Physiol.*, **323**, 442 (1953).]

Description and discussion of a case characterized by loss of eyesight and the usual circulatory collapse on the 3rd day, but death only after 16 days.

ERICH HIRSCHBERG (Chem. Abstr.)

Cerebral Chemotopography. (1) Distribution in Various Zones of the Brain of Dogs of Monamine and Diamine Oxidase. Buscaino, G. A., and Pasolini, F. [*Boll. soc. ital. biol. sper.*, **28**, 300 (1952).]

Amine oxidase was found in the cortex of 32 per cent. of the animals just after death and in 46·6 per cent. an hour later; similarly in white cerebral substance 32 per cent. and 43 per cent.; in nuclei of the base 40 per cent. and 16·6 per cent.; in cerebellum 32 per cent. and 28 per cent.

(2) Cerebral Amine Oxidases and Predisposition to Reflex Epilepsy. [*Ibid.* 1365.]

Monamine oxidase was found most frequently in dogs in the nuclei of the base, then in the cerebellum, white cerebral substance, cortex, and thalamus. Diamine oxidase was found in descending order in thalamus, nuclei of the base, cerebellum, cortex, and white cerebral substance. No difference was found between the motor and occipital cortex nor between caudate nuclei alone and nuclei of the base *in toto*. Amine oxidase was found in only 1 of 15 dogs predisposed to reflex epilepsy (Amantea test) and in 7 of 12 not predisposed.

M. ELLIOTT (Chem. Abstr.)

Cerebrospinal Fluid Inorganic Phosphorus in Normal Individuals and in those with Viral Involvement of the Central Nervous System. Odessky, Louis, et al. [*J. Lab. Clin. Med.*, **41**, 745 (1953).]

The average normal value of inorganic P in cerebrospinal fluid is 1·4 mg. per cent.; the value is considered elevated if above 2 mg. per cent. The statistically significant levels found in virus diseases are pathognomonic of central nervous system involvement.

EDWARD J. VAN LOON (Chem. Abstr.)

Amine Oxidase in Normal Subjects and Those with Diseases of the Nervous System. Buscaino, G. A. [*Boll. soc. ital. biol. sper.*, **27**, 1617 (1951).]

Monamine oxidase was tested against β-indoleëthylamine-HCl, β-phenylisopropylamine-H_2SO_4, and tyramine-HCl, and diamine oxidase against histamine-2HCl. Defibrinated blood of healthy subjects showed no amine oxidase activity. Neurologic patients showed slight monamine oxidase activity. The enzyme was present in 55 per cent. of schizophrenics and in 80 per cent. of patients in the confused state. M. ELLIOTT (Chem. Abstr.)

The Cholinesterases of the Central Nervous System after the Administration of Organo-Phosphorus Compounds. Davison, A. N. [*Brit. J. Pharmacol.*, **8**, 212-16 (1953); *cf. C. A.* **47**, 2889*b*.]

The effect of injecting diisopropyl fluophosphonate (I), tri-o-tolyl phosphate (II), bis-(isopropylamino) fluorophosphine oxide, pyrophosphoric acid tetraisopropylamide, O, O-diisopropyl O-p-nitrophenyl phosphate or tetraisopropyl pyrophosphate on the true cholinesterase and pseudocholinesterase (III) of brain, spinal cord, and sciatic nerves of chickens was described. (I) and (II) produced demyelination. All but (II) showed no essential differences in the degree of duration of inhibition of true cholinesterase and (III). (II) produced very prolonged inhibition of (III). (I) reduced (III) of rat brain and spinal cord but did not produce demyelination. Prolonged depression of (III) is not an essential prerequisite of demyelination in fowls. RICHARD F. RILEY (Chem. Abstr.)

Influence of Excitation of the Central Nervous System on Some Metabolic Processes of Adrenaline in the Walls of Blood Vessels and in the Adrenals. Utevskii, A. M., and Butom, M. L. [*Biokhimiya*, **18**, 195-200 (1953).]

Rabbits were given 0·05 g. caffeine per kg. weight, and 25 minutes later were sacrificed. The adrenaline (I) content in the walls of the large blood vessels (where (I) exerts its effect) increased in some cases, whereas in others no effect was observed; dehydroadrenaline (II) was absent. Caffeine brought about an increase in the (I) content of the adrenals (where (I) is formed). In another series of experiments a group of rabbits received caffeine and 6 γ (I) per kg. weight. No changes were observed in the (I) content of the blood vessel walls. But rabbits which had received caffeine and (II) showed a decreased (I) content in the blood vessel walls, as compared to the animals which had received only caffeine, or caffeine and (I). A decrease of (I), instead of an increase, was noted in the adrenals of rabbits which had been given caffeine and (I), or caffeine and (II). H. PRIESTLEY (Chem. Abstr.)

Neurohumoral Regulation of Activity of the Posterior Section of the Hypophysis. Gavrilova, L. N. [*Fiziol. Zhur. S.S.S.R.*, **39**, 352-6 (1953).]

Spinal fluid (0·5 ml.) taken from cats under mild chloral narcosis shows no action on isolated guinea-pig uterus. The fluid taken after intraarterial introduction of 2-3 mg. adrenaline or acetylcholine causes uterine contractions. The substance that activates the uterus appears in 2 phases, the 1st appearing in 15-20 minutes and lasting 5-20 minutes, the 2nd appearing in 4-6 hours and lasting 7-8 hours. Hypophysectomized cats do not show this effect. The action is directed on the posterior part of the hypophysis.

G. M. KOSOLAPOFF (Chem. Abstr.)

Stability of Restored Reflex Functions. Dmitriev, V. D. [*Fiziol. Zhur. S.S.S.R.*, **39**, 293 (1953).]

Transverse section of the spinal cord at the mid-body region in reptiles and amphibia leads to paralysis of the affected hind limbs, with resulting awkward crawling. Gradually the motor function becomes compensated or restored, but this effect is readily destroyed by narcotics, such as EtOH, Et_2O, chloral hydrate, or urethan.

G. M. KOSOLAPOFF (Chem. Abstr.)

Comparative Study of the Epileptogenic Limit Value of Photometrazole Stimulation in Two Cases of Tetany. Alajouanine, Th., et al. [*Bull. mém. soc. méd. hôp., Paris*, **69**, 234 (1953).]

The photo-metrazole limit value (1) is the amount of metrazole solution, 50 mg./ml. (concentration not given in the paper), which, followed by an intermittent light stimulation of 5 cycles/sec., provokes bilateral synchronic discharges with myoclonuses. In hypoparathyroid tetany (1) is diminished to about 8 ml., but in a tetanic patient having a normal blood Ca, even 17 ml. of the metrazole solution was devoid of epileptogenic effect.

GEO SAG (Chem. Abstr.)

Metabolism and Muscle Tone in Psychotics. Eiff, A. W. v., et al. [*Deut. Arch. klin. Med.*, **199**, 581-99 (1952).]

No characteristic behaviour of basal metabolism or muscle tone distinguishes schizophrenics from cyclic depressives; in the former the basal metabolic rate was increased by 13 per cent. −3·3 per cent.; in the latter by 12 per cent.—2·8 per cent. Muscle tone results were likewise closely similar. The catatonic stiffness observed in hypnosis is of tetanic origin, characterized by a large increase in muscle tone and energy metabolism.

P. Y. JACKSON (Chem. Abstr.)

The Influence of the Concentrations of Potassium, Calcium and Magnesium in the Cerebrospinal Fluid on Respiration. Verstraeten, Jean Marie. [*Rev. belge pathol. et méd. exptl.*, **20,** 1 (1950).]

An increase in Ca in the cerebrospinal fluid produced respiratory depression, while a decrease caused acceleration. An increase in K accelerated, while an increase in Mg inhibited respiration. Decreases in K and Mg had no effect. Accelerating and depressing effects can be mutually compensating.

The Influence of the Concentrations of Potassium, Calcium, and Magnesium in the Cerebrospinal Fluid on the Consumption of Oxygen. Ibid. 22-32.

The above described effects were reflected in the O consumption of the animals. These effects were not modified by thyroidectomy or parathyroidectomy or by denervation of the adrenal gland. Therefore, they were not of humoral origin. However, the effects were prevented by curarization of the animals, although the parallel vasomotor effects remained. The changes produced in O consumption must, therefore, depend upon nervous effects on the muscular activity. M. G. Moore (Chem. Abstr.)

Central Transmission of Afferent Impulses. III. Occurrence and Significance of the Substance P in the Dorsal Spinal Roots. Lembeck, F. [*Naunyn-Schmiedebergs Arch. exptl. Pathol. Pharmakol.*, **219,** 197 (1953).]

Posterior spinal roots, spinal cords and intestines from cattle were extracted with diluted H_2SO_4 of pH 4-5 by boiling, and the extract was neutralized with NaOH. The posterior dorsal root extract produced in the isolated guinea-pig intestine contractions which could be differentiated from those elicited by acetylcholine, histamine and adenosine triphosphate. Extracts from the ventral roots have this action either not at all or very faintly. The substance was compared with substance P from intestines. There was agreement in solubility, dialyzability, stability at various pH values, action on the perfused rabbit ear, and in the Rf values in paper chromatography. Blood pressure tests showed the presence of a 2nd hypotensor substance which is not specific for the dorsal roots. Substance P was destroyed by an enzyme contained in the dorsal roots. The similarity with the "stimulating substance of sensory nerves" suggest the function of substance P as a transmittor in the 1st sensory neurons.

IV. Distribution of the Substance P in the Central Nervous System. Kopera, H., and Lazarini, W. [*Ibid.* 214-22.]

The distribution of substance P in the tissues of the central nervous system of cattle and cats was evaluated on the isolated guinea-pig ileum treated with atropine and antihistaminics. The various parts of the brain differ considerably. A. E. Meyer (Chem. Abstr.)

Characteristics of the Excitor Substance of Sensory Nerves. Hallauer, H. F. [*Naunyn-Schmiedebergs Arch. exptl. Pathol. Pharmakol.*, **219,** 234 (1953).]

Extracts of the dorsal roots of the spinal column contain a substance that has in the isolated rabbit ear a capillary-dilator action, which effect is not found with extracts of ventral roots prepared by the same method. The substance is sensitive to O_3, alkali, and heat; stable only at weak acidity; soluble in H_2O; insoluble in Et_2O; not precipitated with colloidal Fe_2O_3; adsorbable on Al_2O_3, active charcoal and silica gel; dialyzable, and ultrafiltrable. Substance P is resistant to alkali; equally resistant is the substance from posterior roots responsible for the contraction of the isolated guinea-pig ileum. Adenosine triphosphate is stable to alkali and shows the capillary-dilator and intestine-contracting effect only at the high concentration of 0·4 mg./ml. A. E. Meyer (Chem. Abstr.)

Neurological Aspects of the Hunger Winter in Holland. Posthumus, Meyjes, F. E. [*Folia Psychiat. Neurol. Neurochirurg.* (*Amsterdam*), **51,** 257 (1948); *Excerpta Med., Sect. VIII*, 2,831 (1949).]

No major neuropathies were observed, probably because the food had a fairly high vitamin B_1 content, although scarce and low in calories. Low temperature, low basal metabolism, and habituation to a limited vitamin B_1 intake were also factors.

W. C. Tobie (Chem. Abstr.)

Paper Chromatographic Spinal-fluid Determinations. (I) The Paper Chromatographic Preparation of Amino Acids of Cerebrospinal Fluid Before and After Hydrolysis. Schonenberg, Hans. [*Z. Kinderheilk.*, **73,** 8 (1953).]

Before hydrolysis of normal fluid, lysine, alanine, and leucine may be found, while after hydrolysis glutamic acid, glycine, serine, cystine, and valine were isolated.

Dorit L. Noether (Chem. Abstr.)

Localization of Glycolytic and Respiratory Enzyme Systems on Isolated Mouse-brain Mitochondria. Hesselbach, M. L., and DuBuy, H. G. [*Proc. Soc. Exptl. Biol. Med.*, **83,** 62 (1953).]

Washed mouse-brain mitochondria carried out the complete enzymic conversion of, exogenous glucose to CO_2 and H_2O. Glucolysis took place anaerobically and aerobically, with

production of lactic acid. Under aerobic conditions glucose was oxidized through a malonate-sensitive cycle, and the accumulation of lactic acid was correspondingly decreased. In contrast, the clear supernatant carried out anaerobic and aerobic glucolysis, but not oxidation of glucose. The submicroscopic particle fraction did not carry out the reactions of either system.
L. E. Gilson (Chem. Abstr.)

Application of Countercurrent Methods to the Fractionation of Lipide Material from Brain. Cole, P. G., et al. [*Biochem. J.*, **54,** 449 (1953).]

Homogenized adult human brain was dehydrated at room temperature by 3 consecutive 24-hour extractions with acetone (1 l. per kg. wet tissue) and the residue was extracted 3 times with a solvent consisting of 2 vols. MeOH and 1 vol. $CHCl_3$ (2·5 l per kg. wet tissue). Both extractions were condensed separately under vacuum at below 50° and then combined. To avoid troublesome emulsification the following solvent system was devised: 62 vols. CCl_4+ 35 vols. MeOH+3·15 vols. H_2O for the countercurrent fractionation of brain lipides. This mixture was modified for fractionation of more polar lipides and for the separation of cholesterol and neutral fats.
S. Morgulis (Chem. Abstr.)

Hypertension and Tachycardia Due to Concussion of the Brain. Raab, W. [*Am. Heart J.*, **37,** 237-48 (1949); *mainly Pathol.*]

The similarity of the symptoms of cerebral concussion to those of encephalitis, poliomyelitis of the upper medulla, and brain tumors near the third ventricle suggests that they may be due to excess of the sympathetic amines adrenaline, encephalin, and sympathin.
W. C. Tobie (Chem. Abstr.)

Prothrombin Time in Schizophrenia. Cacopardo, Antonino. [*Boll. soc. med. chir. Catania*, **19,** 107 (1951).]

In 100 patients a 66 per cent. increase of the prothrombin time, especially in acute and relapsing cases, was observed. This is ascribed to liver and intestine alterations.
C. Scandura (Chem. Abstr.)

Nicotinic Acid Content of Blood, Cerebrospinal Fluid, and Urine in Hydrocephalus. Corda, R. [*Ann. ital. pediat.*, **6,** 47-53 (1953).]

In 5 patients the nicotinic acid (1) content was 260-380 γ per cent. in blood, 26-29 (3 cases) and 36-40 (2 cases) in cerebrospinal fluid, and 498-1,600 γ/24-hour specimen of urine. The ratio between the (1) concentration of blood and that of cerebrospinal fluid tended to increase.
C. Scandura (Chem. Abstr.)

The Potassium and Sodium Level of the Cerebrospinal Fluid in Tuberculous Meningitis. Urban, N. [*Monatsschr. Kinderheilk.*, **98,** 145 (1950).]

The K and Na ion concentration usually remained within the normal range in tuberculous meningitis. A high K value was usually accompanied by a low Na value and conversely. During the course of the disease there was a tendency for the Na concentration to decrease and the K concentration to increase. In chronic cases the Na level was constantly low and the K level constantly high.
M. G. Moore (Chem. Abstr.)

Effects of Aging, Arteriosclerosis, and Hypertension Upon the Cerebral Circulation. Shenkin, Henry A., et al. [*J. Clin. Invest.*, **32,** 459 (1953).]

Aging and arteriosclerosis unaccompanied by hypertension did not significantly reduce the cerebral blood flow or metabolism. The occurrence of hypertension and arteriosclerosis together was accompanied by reduction in cerebral blood flow and O consumption.
John T. Myers (Chem. Abstr.)

Chemical Factors of Nervous Excitation in Experimental Hypertonia. Kakushkina, E. A., and Mentova, V. N. [*Fiziol. Zhur., S.S.S.R.* **39,** 324 (1953).]

Experiments with dogs in which an experimental hypertonic state was achieved either by moving the kidneys to under the skin with ligation of the arteries, or by concussion trauma of the head, showed that cholinesterase activity of the blood serum during the hypertonic state rises. A direct connection exists between the cholinesterase activity and the actual level of arterial pressure. Addition of an anticholinesterase agent (Fosfakol) lowered the cholinesterase activity and reduced the arterial pressure. If the enzyme activity drops below 50 per cent. of normal level, however, the arterial pressure rises once again.
G. M. Kosolapoff (Chem. Abstr.)

The Hemato-encephalic Barrier in the Horse. I. The Sodium Chloride Content of the Cerebrospinal Fluid and of the Blood Serum. Behrens, H. [*Deut. tierdrztl. Wochschr.*, **57,** 103 (1950); *Chem. Zentr.* (1950), *II*, 2335.]

The cerebrospinal fluid was drawn by occipital puncture from 31 neurologically healthy horses under chloral hydrate narcosis. The NaCl content was determined by the Brause modification of the Van Slyke method. Values of 552·26-656·70 mg. per cent. are reported for the NaCl content of the serum, with a mean of 591·27 mg. per cent. Corresponding values for the cerebrospinal fluid were 671·58-780·57 mg. per cent. with a mean of 728·90 mg. per cent. The quotients thus were 0·77-0·85, with a mean of 0·81. Protein determinations carried out simultaneously on the cerebrospinal fluid showed only a limited relationship between the NaCl content and the protein content of the fluid. Accordingly, the Donnan equil. can be assumed only with limitations. M. G. MOORE (Chem. Abstr.)

Action of Hormones of the Suprarenals on the Content of Ascorbic Acid in the Brain. Kudryavtseva, N. G. [*Fiziol. Zhur. S.S.S.R.*, **39**, 357 (1953).]

Removal of one suprarenal in a rabbit leads to a drop of ascorbic acid in the brain. Administration of adrenaline also lowers brain ascorbic acid. Cortin causes a distinct rise of ascorbic acid, most shown in the cerebrum. Water content is not altered by removal of one suprarenal or long administration of adrenaline. Introduction of cortin causes a slight rise of the content of dry matter, i.e. slight dehydration of the brain tissue.

G. M. KOSOLAPOFF (Chem. Abstr.)

Cerebral Metabolism. Gordan, Gilbert S., et al. [*Calif. Med.*, **78**, 87 (1953.)]

A review of the influence of steroids on cerebral metabolism. Twenty-seven references.

F. FROMM (Chem. Abstr.)

Blood-pyruvate Levels in Subacute Combined Degeneration of Cord. Effect of Vitamin B_{12} Therapy. Earl, C. J., et al. [*Lancet*, **264**, 115 (1953).]

Increased blood-pyruvate levels were found in 3 untreated persons having subacute combined degeneration of the cord. Parenteral administration of crystallized vitamin B_{12} returned these levels to normal. Values for a-ketoglutaric acid were not raised and were unaffected by B_{12} therapy. BARBARA R. MURRAY (Chem. Abstr.)

Genesis of Sleep (Magnesemia and Vitamin B_6). Buscaino, V. M., and Balbi, R. [*Boll. soc. ital. biol. sper.*, **28**, 113 (1952).]

Nightly increase in blood Mg was noted in most cases; the increase was accentuated by treatment with vitamin B_6. Low blood-Mg values were frequent in cases of insomnia.

M. ELLIOTT (Chem. Abstr.)

2. Pharmacology and Treatment

Determination of Barbiturates. Ultraviolet Spectrophotometric Method with Differentiation of Several Barbiturates. Goldbaum, Leo R. [*Anal. Chem.*, **24**, 1604 (1952).]

A simple, specific, and rapid ultraviolet spectrophotometric method for determination, identification, and differentiation of various barbiturates is described. Amobarbital, pentobarbital, secobarbital, butallylonal, phenobarbital, and cyclopal can be differentiated by characteristic ratios obtained from differences in absorption spectra of the barbiturates in strong alkali and pH 10·5 solution at various wave lengths with that at 260 mμ. The procedure has been applied to blood, urine, and tissues. M. BLITZ (Chem. Abstr.)

Cholinesterase of Serum in Relation to Electronarcosis. Franchini, Carlo. [*Giorn. psichiat. e neuropatol.*, **79**, 321 (1951).]

In 14 patients with various mental diseases the average cholinesterase activities of serum (in mg. acetylcholine freed by 1 cc. serum diluted 1 : 10) were 6·22, 7·39, 5·97, and 6·20 respectively before, during, 1 hour after, and 2 hours after electronarcosis.

C. SCANDURA (Chem. Abstr.)

Effects of Ethyl Alcohol on Cerebral Blood Flow and Metabolism. Battey, Louis L., et al. [*J. Am. Med. Assoc.*, **152**, 6 (1953).]

The cerebral blood flow, cerebral metabolism and cerebral vascular resistance were measured in 15 subjects before and during intravenous administration of EtOH and in 12 patients during and after severe self-induced alcohol intoxication. The administration of EtOH in doses sufficient to produce facial vasodilatation and the mental changes of mild inebriation produced no changes in cerebral blood flow, cerebral metabolism, or cerebral vascular resistance. During acute, severe alcohol intoxication, there was a pronounced increase in mean cerebral blood flow, an equally significant reduction in cerebral O uptake, and a reduction in cerebral vascular resistance, as compared with the values obtained after recovery. Low concentrations of alcohol in the blood (averaging 68 mg. per 100 cc.) had little or no measurable effect on cerebral circulation, while high levels (averaging 320 mg. per 100 cc.) produced a pronounced depression in cerebral O consumption, despite an increase in blood flow. There appears to be no rational basis for the use of EtOH as a vasodilator in patients with cerebral vascular disease. EDWARD J. VAN LOON (Chem. Abstr.)

Pharmacological Properties of Dihydro-1, 4-benzothiazine—Depressant Action on Interneuronic Conduction at the Level of the Central Nervous System. Longo, V. G. [*Arch. intern. pharmacodynamie*, **89,** 55 (1952).]

Administered orally or intraperitoneally this drug produces muscular relaxation, ataxia, and paralysis, with death from respiratory failure. In mice, the LD_{50} is 800 mg./kg. by the former route and 200 mg./kg. by the latter, while 200 mg./kg. and 100 mg./kg., respectively cause paralysis in 50 per cent. of the animals. Small nonparalytic doses inhibit the polyneuronic reflex of the medulla, while even large amounts have no effect on neuromuscular conduction. Since it is also antagonistic to convulsant drugs like strychnine, it may be classified as an interneuronic blocking agent similar in action to myanesin and benzimidazole.

C. S. PRICKETT (Chem. Abstr.)

The Antagonism Between a Barbiturate and Thiamine, and its Physiological Significance. Alibrandi, G., et al. [*Arch. intern. pharmacodynamie*, **92,** 173 (1952).]

In rats 100 mg. of thiamine/kg. antagonizes the hypnotic action of 30-45 mg. of pentothal/kg., while 50γ of prostigmine/kg. prevents sleep from 50 mg. but not from 60 mg. of pentothal/kg. Since prostigmine and the barbiturates have been shown to have a typical selective action, but in opposite directions, on the phenomenon of central nervous after-discharge, it is probable that the ability of thiamine to antagonize pentothal in this case depends on the known relation between this vitamin and acetylcholine. C. S. PRICKETT (Chem. Abstr.)

Pharmacology of the Vestibulo-ocular Reflex. (*I*) *Action of Analgesics, Barbiturates, Convulsive Drugs, and Drugs of the Vegetative Nervous System on Post-rotatory Nystagmus in the Rabbit. Longo, V. G., and Napolitano, L.* [*Arch. intern. pharmacodynamie*, **92,** 177 (1952).]

The action of the drugs below on the vestibulo-ocular reflex of the rabbit was studied by rotating the animal on a turntable at the rate of 360°/sec., and registering nystagmus during and after rotation by means of 2 needle electrodes fixed at the outer canthi and connected to a Grass EEG apparatus. Morphine, meperidine, and methadone inhibited the nystagmic response. Barbital, phenobarbital, numal, and evipal diminished the amplitude but increased the duration of the response. Strychnine, picrotoxin, and metrazole inhibited the reaction only at doses that caused tremors or convulsions. The inhibitory action of bulbocapnine was not confirmed. Physostigmine caused a lengthened response with increased amplitude of the nystagmic movements. Dramamine had only a weak and inconsistent inhibitory effect, while parsidol reduced the frequency of the nystagmus. The results are discussed in relation to the mechanism of action of these drugs on central nervous system reflexes.

C. S. PRICKETT (Chem. Abstr.)

The Sites of Action of Narcotics, Hypnotics, and Analgesics on Somatic Afferent Pathway. (*I*) *Yasuhara, Motohiro.* [*Folia Pharmacol. Japon.*, **49,** No. 1, 22 (1953); *Breviaria* 2 (*in English*).]

The sites of actions of various drugs on the somatic afferent pathway were studied by examining their effects on electric response (the primary, secondary, and third response described by Dempsey and Morison (*Am. J. Physiol.*, **138,** 283 (1943))) in the central nervous system produced by stimulation of the somatic nerves in rabbits and rats. Ether, chloral hydrate, urethan, and myanesin paralyzed the central nervous system extensively; barbiturates such as amytal, dial, luminal, evipan, and pentothal-Na affected the reticular structure of the mid-brain; and morphine, bromide, and aminopyrine, the medial thalamic nuclei.

SHOZABURO KITAOKA (Chem. Abstr.)

The Behavior of the Outer Ocular Muscles after Curare, Decamethonium (*C-10*), *and Succinylcholine* (*M115*). *Hofmann, H., and Lembeck, F.* [*Naunyn-Schmiedebergs Arch. exptl. Pathol. Pharmakol.*, **216,** 552 (1952).]

The intravenous injection of succinylcholine (M*115*) (1) caused a rise in ocular pressure due to a contraction of the outer eye muscles. Administration of decamethonium (C-10) had similar but less marked action. All muscles especially sensitive to acetylcholine will contract after administration of (1) and similar substances. H. I. CHINN (Chem. Abstr.)

Action of Isonicotinyl Hydrazide on the Nervous System. II. Limits and Possibility of Subarachnoid Administration. Longo, V. G., et al. [*Boll. soc. ital. biol. sper.*, **28,** 1361 (1952).]

Above 6 mg./kg. isonicotinyl hydrazide (1) administered intracisternally was lethal in dogs. In 3 of 8 dogs partial epilepsy resulted at dosage of less than 2 mg./kg. Encouraging results were obtained clinically with 0·1-0·5 mg./kg.

III. Local and Regional Application in the Cerebral Cortex. [*Ibid.*, 1363.]

Only dogs predisposed to epilepsy, as shown by Amantea's test, were adversely affected by cortical application of (1). M. ELLIOTT (Chem. Abstr.)

Anticonvulsants on Electrically Stimulated Metabolism of Separated Mammalian Cerebral Cortex. Forda, Olga and McIlwain, H. [*Brit. J. Pharmacol.*, **8,** 225 (1953).]

Respiration of cerebral tissue slices was increased by stimulation by sine wave ac. at 500 or 2,000 cycles/sec. and became sensitive to anticonvulsant drugs. Trimethadione, diphenylhydantoin, and phenobarbitone were effective at 10^{-4} M and bromide at 3 X 10^{-2} M in depressing the increased respiration. These substances in the indicated concentrations, 10^{-2} M trimethadione, and diphenylhydantoin and phenobarbitone to 10^{-3} M were without a comparable effect on respiration in the absence of applied impulses. They were largely ineffective when respiratory stimulation was induced by sine wave currents of 50 cycles/sec. or brief condenser pulses of 100/sec. All types of stimuli made the respiration more sensitive to buto-barbitone, urethan, and chloral hydrate. RICHARD F. RILEY (Chem. Abstr.)

The Evaluation of Mysoline—a New Anticonvulsant Drug. Bogue, J. Yule, and Carrington, H. C. [*Brit. J. Pharmacol.*, **8,** 230 (1953).]

Mysoline, 5-ethyl-5-phenylhexahydropyrimidine-4, 6-dione (1), was an effective anticonvulsant against electro-shock and leptazol seizures in rats when compared with phenobarbital, 5, 5-diphenylhydantoin, mesantoin, tridione, and phenylacetylurea. A single oral dose of 5 mg./kg. of (1) abolished the tonic extensor component of electrically induced seizure in 60 per cent. of rats and 20 mg./kg. prevented maximal leptazol seizures in over 50 per cent. of rats. (1) had low acute and chronic toxicity in terms of either the LD_{50} or doses producing neurological symptoms or morphological change. RICHARD F. RILEY (Chem. Abstr.)

Action of Sympatholytin on the Development of Post-decerebrational Leucocytary Reaction. Stroikov, Yu. N. [*Fiziol. Zhur. S.S.S.R.*, **39,** 359 (1953).]

Decerebration of cats causes a high level of leucocytosis with increased blood production in the bone marrow. Introduction of sympatholytin (6-10 mg./kg.) sharply reduces the leucocyte count in peripheral blood and prevents the development of post-operative leucocytosis. Blocking of the adrenoreactive centres by sympatholytin does not prevent the generation of new blood in bone marrow, but even appears to aid it. Continuous administration of the drug to rabbits leads to leucocytosis. G. M. KOSOLAPOFF (Chem. Abstr.)

Paralyzing Agents for the Autonomic Nervous System and Emetic Poisons. Cheymol, Jean, and Quinquaud, Alfred. [*J. Physiol.* (*Paris*), **44,** 240 (1952).]

Yohimbine prevented vomiting in dogs when the following substances were given intravenously: aconitine, veratrine (I), nicotine (II), picrotoxin (III), pilocarpine (IV), apomorphine (V), emetine (VI), acetylcholine, tartar emetic (VII), $NiSO_4$, quinone (VIII), Na salicylate (IX). It prevented also vomiting after morphine given subcutaneously and ipecac (X), and mustard (XI) by mouth. It did not prevent vomiting after methylene blue (XII), ouabain (XIII), digitalis (XIV), strophanthin (XV) intravenously, (V) subcutaneously or $CuSO_4$ (XVI), $ZnSO_4$ (XVII) or $SnCl_2$ by mouth. Chloralose protected against (V), (VI), and (VII) intravenously, against (V) subcutaneously and against (X) and (XI) by mouth. It was ineffective against (XII), (XIII), (XIV), $CuSO_4$, and $ZnSO_4$. The barbiturate somnifen prevented vomiting after (II), (III), (IV), (V), (VI), (VII), (VIII), (IX), (X) and (XI) but not after (XII), (XIII), (XIV), or $CuSO_4$. Ergotamine protected against (I), (IV), (V), (X), (XII), (XIII), (XIV), (XV), but not $CuSO_4$ or $ZnSO_4$. Procaine protected only against (IV). It failed to protect against (V), (VI), (IX), (X), (XII), (XIII), or (XVI). H. I. CHINN (Chem. Abstr.)